

Electrical Contracting

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A SERVICE PAPER for electrical contractors, engineers, motor shops, industrial electricians and inspectors, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction—industrial, commercial, residential.

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EVERY year housewives, tailors -- and bachelors -- use 625 tons of steel needles--and needles are only one of literally countless products of steel on which your life, your comfort, and civilization itself depend.

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To carry you comfortably through such a day, hundreds of different kinds of steel are required. To develop these different steels, on which modern life and progress depend, Youngstown has poured millions into research to find better steels, to better serve expanding human needs.

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25-8A

YOUNGSTOWN

AUGUST, 1938

Build A Ball Team!

LISTEN TO THEM and electrical men are great cooperators. It started right after the Boston Tea Party, when we organized the *Rejuvenated Sons of Jove*. Our war cry was "*Altogether, All the Time, for Everything Electrical*".

FOR MY FIRST EIGHTY YEARS OR SO, I thought this was just right. Now, more mature, I begin to wonder. "Why must every electrical man want to marry every other electrical man?" I ask myself.

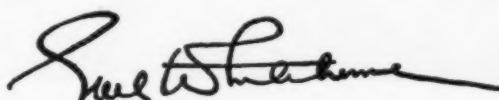
LETTERS COME IN from two important cities, for example. In each they started the Adequate Wiring Campaign. They got all the contractors hot to sell old and new house wiring—plus industrial and commercial. A few of them did. Most of 'em didn't. Blah! But why expect miracles? Why bring everybody in? Naturally, some contractors won't play. It is a waste of time to ask them to.

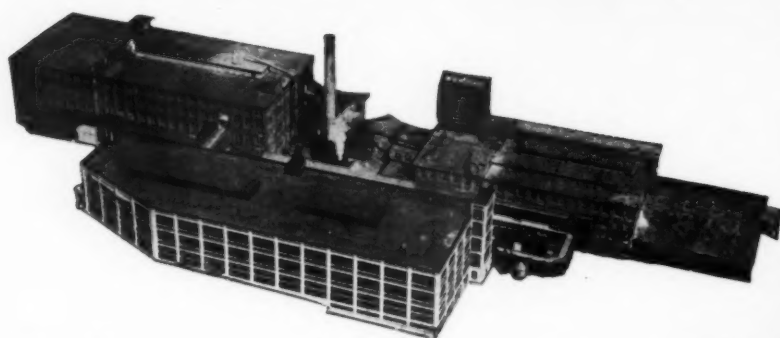
TWO OTHER CITIES, I KNOW, have looked it squarely in the face. The local leaders worked out a list of the men who would fit—as you would pick a ball team. They brought these contractors together and sold them the idea. Then they saw the power company and said "This group makes this proposition. We do this. You do that. If you will deal with us alone in this program, we'll hire salesmen and shoot the works."

AT FIRST THE POWER COMPANY SAID, "We must treat all alike." The answer was—"But we're *not* all alike! You play with us on this program. And if another group brings something else that's good, back them too on their plan." And the power man saw that this was fair—and smart—and played. This is splendid!

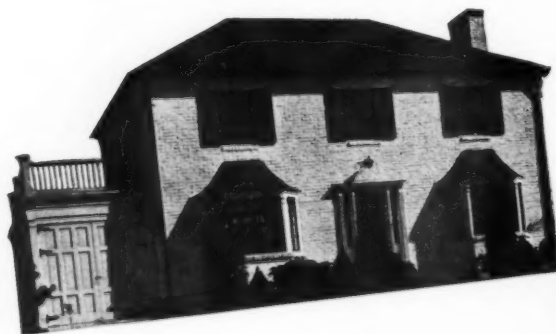
I'M FOR COOPERATION! Make no mistake. But not the mealy-mouthed kind where nothing gets done, because all the weak sisters want to ride, and all the loafers do no work. We've had too much of that.

AND SO I SAY—When you want to sell wiring, *build a ball team!* Pick a Babe Ruth and a Vander Meer and maybe a Di Maggio. Call in the good men, big and little, who will play the game. And let the sand lot guys start another match. Meanwhile, the industry is getting somewhere.





Your job ?



Today . . . some Electrical Contractors specialize in residence wiring and repairs. Others have built up an industrial business. Still others, in large cities, do almost nothing but commercial buildings.

Yet . . . regardless of what type of work you do . . . Graybar can serve you *completely*. Because Graybar's 60,000 electrical items meet

every electrical need. Because Graybar has grown up with the electrical industry from the beginning and knows what those needs are.

Furthermore, a well-stocked Graybar warehouse near you makes its products quickly and conveniently available. (Counter Service for quick pick-ups! . . . Or use your telephone for prompt delivery). Try Graybar, for everything!

Everything electrical for all types of Contracting



GraybaR



OFFICES IN 85 PRINCIPAL CITIES • EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

Engineered for Modern Living

By Sullivan A. S. Patorno
Consulting Engineer



MODERN LIVING attains new standards in New York's first air conditioned, electric kitchen apartments.

COUNTRY QUIET has been achieved by unusual features of insulation against street and machinery noises.



Some unique features of New York's apartment without radiators, which sets new standards for electrical utilization and tenant-controlled comfort.

NEW YORK has something new among its smart rental properties. It is the first completely year-round air conditioned apartment building, a twelve-story structure at 25 East Eighty-third Street. Frederick L. Ackerman, architect, Ramsey and Sleeper, associates, through their concept of future improvements in advanced living comfort, and their courage to carry through the required

changes in present day building construction, have created this modern building. Here the designers have conceived a coordination of modern construction materials with mechanical equipment. It eliminates street noises, purifies and conditions the air at all seasons, pours a flood of sunlight through glass brick walls without glare, while shutting out its heat. It provides also the convenience and comfort of electric cooking, auxiliary electrical heat in bathrooms, readily accessible general outlets, and facilities for television reception in all apartments.

An outstanding quality of the design

is the elimination of noise. With every apartment air conditioned the year around, it will be unnecessary for tenants to open windows, and street sounds are shut out. Also, this is a monolithic structure in which the concrete floors have impact-deadening surfaces and unusual measures have been taken to insulate the apartments against sound. Cork floors were laid in all living rooms, foyers, bedrooms and connecting halls. The floors of all public halls are covered with asphalt tile, a comparatively new product that is resilient yet virtually indestructible under ordinary use. In this way footsteps will be deadened throughout the building.

Public halls are furred, and closets and conditioning spaces form a sound-baffle between halls and apartments. All floors are laid over solid concrete slabs, seven inches thick. Living room ceil-

Electrical Contracting, August 1938



TENANT DIGNITY is enhanced by lobby-controlled inter-phones. The entrance has a luminous central column flanked by lighted glass brick doorways.



KITCHEN COMFORT includes a 10.5 kw electric range, good lighting, plenty of outlets, and the circuit breaker load center for each apartment.



BATHROOM FEATURES employ auxiliary electrical heating for night use, in addition to dual lumiline mirror lighting, razor outlet and convenient controls.



UNITARY CONDITIONING system gives each tenant his own controlled weather. Isolated rooms allow maintenance access without annoyance.

ings have an acoustical finish with excellent sound-absorptive qualities. Moreover, all machinery, piping and heavy hangers are noise and vibration-insulated to prevent mechanical noises being transmitted to apartments. Consequently, each tenant will enjoy a quiet comparable to that of a country home.

The building has a gross cubage of 1,100,000 cubic feet. The first floor is used for stores, a doctor's office, the superintendent's apartment, and maids' rooms. The second to eleventh floors, inclusive, contain five apartments each, of various sizes. The twelfth floor consists of three apartments. Above the twelfth floor is a sun room, a games room and a playroom.

Erected at a cost of about \$750,000, the wiring installation totaled \$50,000.

MECHANICAL NOISE from motors and pumps is isolated by special insulating blocks, flexible couplings, and even rubber-cushioned hangers for large pipe racks.

ELECTRICAL FEATURES FOR APARTMENT COMFORT

1. Completely air conditioned building 1,100,000 cubic feet in size.
2. Kitchen and bathroom air separately exhausted to roof.
3. Independent year-round temperature and humidity controls.
4. Electric ranges rated 10.5 kw., can be unplugged and replaced if defects develop.
5. Electric bathroom heaters of 1320 watts provide quick night heat without altering room temperatures.
6. Circuit breakers in kitchens, control four to seven circuits and range.
7. Motorized laundry in basement available to servants.
8. Central radio antenna and two coaxial down-leads serve one or more radio outlets in each apartment with all broadcast frequencies and television.
9. All piping terminates in vibration-insulated devices at rubber cushioned pumps, fans, compressors and motors, to prevent mechanical noises being transmitted to apartments.
10. Lobby-controlled announcement of guests through private telephones. This system is selective ringing and talking to service employees. Public telephones to one or more rooms in all suites.
11. All apartments on master house meter, eliminating submetering problem and simplifying feeder system for 55 apartment suites.

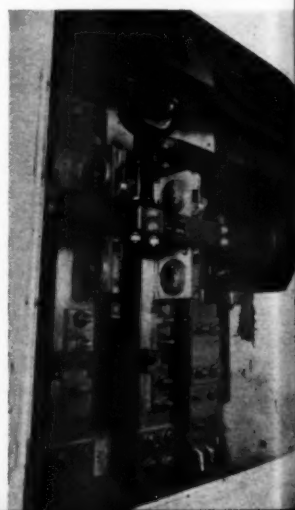
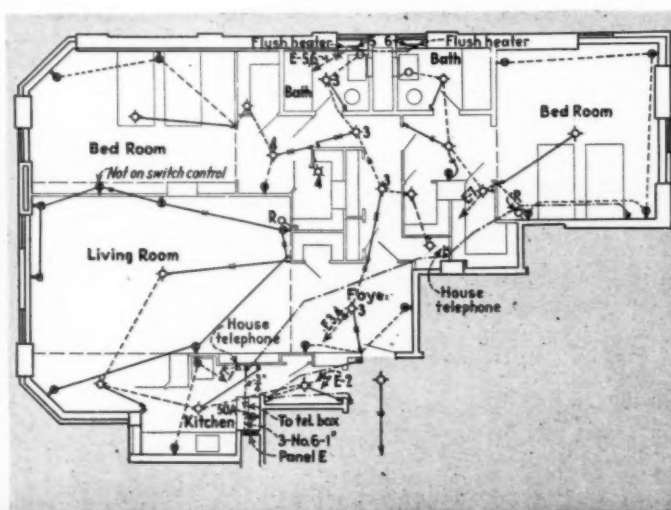
WIRING LAYOUTS like for this typical apartment occurring on eleven floors, leave little to be desired later.

From its neat and inconspicuous radio antenna mast atop the penthouse, to the various automatic controls in the basement machine room, the use of electrical equipment has been worked out to provide noiseless, maintenance-free service for modern apartment living.

With some 90 motors, totaling about 300 hp., there are individual floor-type air conditioning units for each of fifty-five apartments. These units are located on each floor in two conditioner rooms set apart for easy access and maintenance without disturbing any tenant. The refrigeration plant employs one 100-hp. and one 50 hp., synchronous motors to drive Freon compressors. In addition there are various pumps, automatic heating equipment,

(Continued on Page 59)

ADEQUACY ASSURED for modern electrical loads, with a 2000-amp service switch fed from busway extending in from the transformer vault.





TO MAKE Wiring Interesting

Here's how the Philadelphia Electric Company is dramatizing the need for adequate home wiring.

SINCE wiring is concealed from view we say the public has no interest in the subject. So to make adequate wiring interesting for 100,000 visitors to the recent Philadelphia Electrical Exposition, the frame for a 3-room, 18-ft. by 27-ft. house was exhibited indoors with all its necessary electrical trimmings. A good example of adequate wiring was all left accessible for examination.

An official of the Philadelphia Electric Company, who spent about \$8,000 to put on this exhibit, reports a tremendous interest and feels well repaid for the expenditure. Already the largest local speculative builder of homes selling for \$5,000 to \$6,000 has decided to provide 60-amp. services instead of 30-amp, as formerly used, for 35 new houses.

The exhibit framework was made up from smooth finished lumber and given a walnut stain. This was fitted out with white enameled window and door trim. All outlets were set in a small patch of

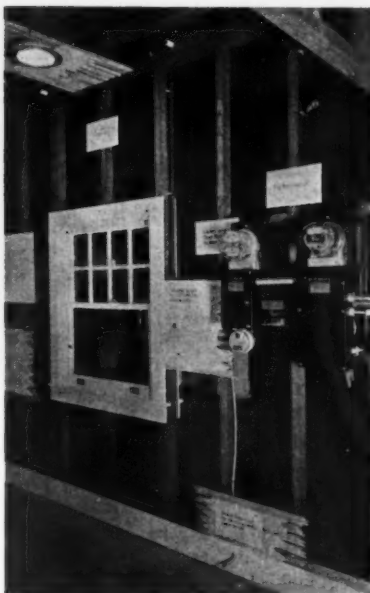
finished wall simulating conventional lath and plaster construction.

The wiring displayed an assortment of armored cable, non-metallic sheathed cable, service and range cable, low-tension bell wire, knob-and-tube radio leads, and several lengths of multi-outlet plugging strip. A 60-amp service incorporated the latest service, metering and grounding equipment, also over-current protective devices for the range and water heater circuits. Six branch circuits for this 3-room layout were connected to a multi-breaker placed near the center of the house.

At each outlet there was a neatly lettered poster such as: "Don't forget an outlet for the exhaust fan"—"Make sure you have a radio outlet or two in each room"—"Weatherproof receptacle for porch, so you can enjoy outdoor eating with toaster, percolator and roaster or for special lighting"—"Use an illuminated house number. Don't lose friends because they can't find your

COMPLETE JOB—From this 60-amp service the entire system was accessible to show the public what is normally behind the plaster.

HEAVY LOADS in the modern kitchen and basement received emphasis for their present and future needs.



house"—"Provide continuous outlets handy to kitchen labor savers"—"Outlet with an automatic reminder-pilot light that glows if you have forgotten to turn off the circuit".

This exhibit was later moved from the Electrical Exposition to the Electrical Progress Exhibit where industrial engineers, contractors, architects and building owners viewed it with equal interest. It will be loaned to other organizations and used to further Philadelphia's drive for adequate wiring.

16 A/W IDEAS IN 3 ROOMS

- Sixty-amp service
- Range circuit
- Water heater circuit
- Six- 15 amp branch circuits
- Convenience switches
- Plenty of plug-ins
- Continuous outlet strip
- Outdoor plug outlet
- House number light
- Chimes versus bells
- Plenty of radio outlets
- Kitchen ventilator
- Tell-tale pilots
- Electric clock outlets
- Eye-comfort lighting
- Adequacy for present and future



ELECTRICAL HEADQUARTERS — Robert G. Whiting, chief electrician has spent 21 years looking ahead of plant trouble and teaching others to help.



PLANNED FOR PEAKS—Here six 1000 kva transformers, served from duplicate 26,000-volt feeders, occupy this orderly substation layout. It was planned years ahead and expanded as the load increased.



MAIN LOAD CENTER—Here the plant pulse beats are taken. At right:—Controls for 26-kv primary feeders, and 2200-volt feeders to transformer stations. At left:—Control panels for m-g sets in background.

SOME folks call it "preventive maintenance." But with Robert G. Whiting it is just a 21-year record of looking ahead of trouble. And electrical maintenance is no small operation in a plant like that of the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc.

Here in Passaic, N. J., are some 50-odd major structures, using over 14,000 horsepower, more than 1900 motors. In these buildings are machines and processes for making a wide variety of mechanical rubber goods—fire hose, brake lining, belting, packings and soft rubber molded products. This involves heavy-duty drives for the rubber mills and all sorts of smaller industrial motors in a countless number of specialized operations. Needless to say, all the other elements of large-scale distribution lighting, and signalling are present.

Just what does the electrical "chief" of this big enterprise do to keep ahead of his changing problems? Well, Whiting talks as though it was a very simple job. He gives credit to the smooth teamwork and loyalty of his 20-man crew of plant electricians.

But behind all this is a maintenance policy and we find these ten rules set down that guide his department in their work—

- 1 *Watch the load.* This means from the main service and transformers to various departments. Don't let it catch up on you.
- 2 *Know your feeders.* Regardless of how well they were planned, years go by quickly and many feeders become inadequate or inefficient for handling added burdens.
- 3 *Plan periodic tests.* Don't depend upon luck to pull your system through critical peak loads. Know the condition of insulation after years of exposure and heavy loading.

Heading Off

Plant Trouble

An informal visit with the chief electrician of a large New Jersey industrial plant

- 4 *Capitalize on shut down periods.* When a department stops for re-tooling or over the weekend, make megohmmeter tests of important feeders and motor insulation while the system is clear for inspection.
- 5 *Schedule periodic inspections* of oil circuit breakers, controller contacts and distribution equipment. Don't coast along until a shut-down serves warning of neglect.
- 6 *Keep posted on what's new* in electrical equipment and have your latest data on hand for quick reference.
- 7 *Work closely with the plant engineering staff.* They will help you to sell modernization ideas and will back up your recommendations for good equipment.
- 8 *Wean yourself away from second-hand equipment "bargains."* You may

FORM 6000

MOTOR RECORD

MAKE _____ SHOP NO. _____

PURCH. ORD. 5618-E DATE May 12

COST _____ SERIAL NO. 3 R 1

H. P. 3 VOLTS 220/440 AMP. 21

R. P. M. 1750 PHASE 3 CYCLES 2

TYPE R.P.I. FORM _____

SIZE _____ CLASS _____

MODEL W.74.14FL ROTOR VOLTS _____ STYLE _____

TYPE OF BEARING _____

FRONT BEAR. NO. _____ REAR BEAR. NO. _____

BRUSHES _____

DUP. END SHAFT Squirrel Cage

DUPLICATE MOTORS M-17-A M-17-A

CONTROL EQUIP. M.S. # 3906-E

INSTALLED Sept 28 Stretch on Vert

Belt Press

DATE _____ TEST RECORD

RESULTS _____

9 Keep in close touch with all plant processes. It is to your credit to apply better control and protection, also to foresee new uses for electrical equipment.

[illegible]

MOTOR TELL-TALE—More than 1900 motors, transformers, magnetic clutches and other items are recorded on forms like this to give performance history.

[illegible]

And then there's one more rule, that's more than a rule. Whiting sees red when bearing trouble occurs. Although abrasive conditions abound in many areas of this plant, motor bearing burnouts are taboo—and very rare. This is so because one man spends his entire time checking, cleaning and lubricating motor bearings. He knows his 1900 or more motors. He sees the temperamental ones several times a week and has a schedule for all, which varies according to the nature of their work.

The Manhattan Rubber plant represents a big annual business from an electrical standpoint. They purchased 1,329,000 kilo-watt-hours of power at Passaic during August 1937. And the



HAZARDS ISOLATED—The major rubber mill motors are operated at 2200 volts, by remote control buttons. This new dustproof mezzanine gallery houses controls for ten motors totalling 2400 h.p. Each unit has its own ammeter and phase transfer switch.

electrical department budget includes the cost of current as well as payroll and equipment purchases.

Here is a summary of this plant's motors:

5210	connected	H.P.	@	2200	volts a.c.
6172	"	"	@	440	volts a.c.
2642	"	"	@	250	volts d.c.
44	"	"	@	110/220	volts a.c.

14,068 H.P.

- | | |
|-----------|-----------------|
| 1—1000 KW | Motor-Generator |
| 1— 500 KW | “ “ |
| 1— 200 KW | “ “ |

All this activity is centered in the electrical headquarters office, shop and stockroom. Office records are kept of every motor, transformer, magnetic clutch and large instrument transformer. It is possible to refer back 20 years for the history of any such equipment. Likewise, monthly and an-

nual power figures are tabulated and plotted against tonnage of output. Data is kept for each important production unit or machine, giving the horsepower required and periodic check tests. The big objective is to maintain correct motor sizes for all loads, and hold the power factor at a favorable level.

For all complicated equipment there are detailed electrical drawings from which to check back during alterations or when unusual trouble develops. All departments have layout drawings of their feeder systems.

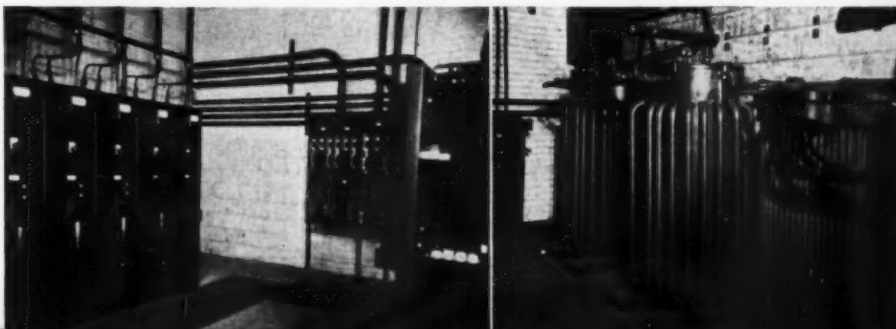
The electrical department supplies operators who start and regulate the large motors in the rubber mill. They remain on duty in this important department to check controller functions and other intricate devices during each shift. These men know how to regulate starting and heavy running loads to avoid building up excessive demand charges.

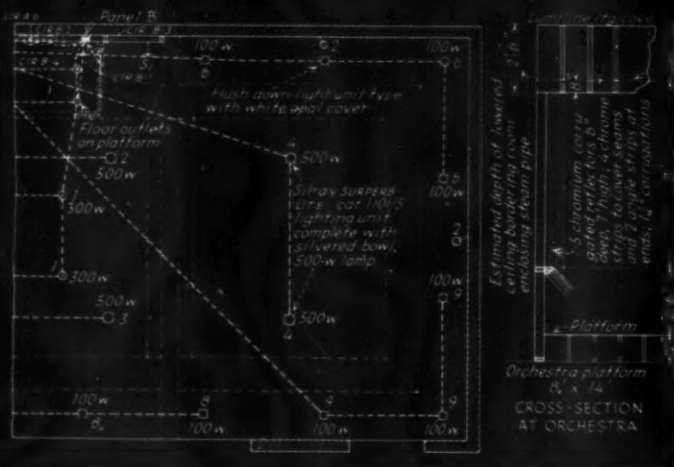
Everybody who works for Chief Whiting "grows up" with the plant and acquires the team spirit. So there is very little turn-over in the gang. Over half the men have been on the job from 10 to 20 years. They work in 6-hour shifts, five days per week. One man has charge of work assignments, and supervises all the teams. Under this supervisor the plant is divided into five sections with a senior man made responsible for general conditions in his area. These men are always "looking ahead of trouble". They are free to make suggestions at all times, and are given credit for discovering trouble-making conditions that would ordinarily go unnoticed.

The installation, maintenance and repair of plant equipment on this scale involves heavy responsibilities. Good results are possible only when the staff is organized for 365-day efficiency. So under Whiting everybody has a steady job to head off plant trouble.

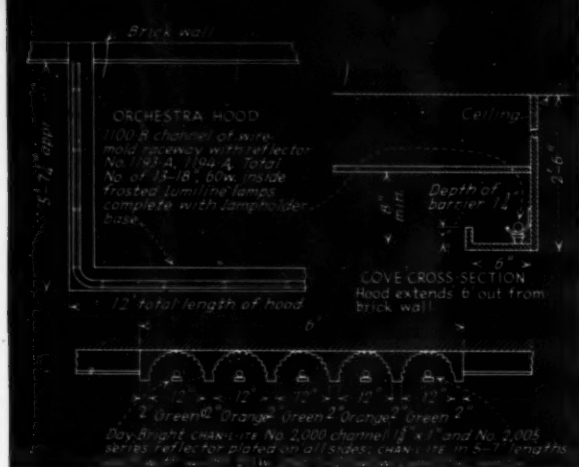
KEEPING AHEAD—Sub-stations have separate rooms for boards and space for more circuits. Secondary panels at left 2200-volt transformer controls at right and lighting feeder panels in center.

BUILDING SERVICE—Typical outlying station for 2200-volt transformer banks. This station now has for 440-volt power two 200's and two 100's, also two 50's and one 75 for lighting.





PLANNED TO FIT—Worked out in harmony with ceiling alterations, this layout makes possible an economical and flexible improvement.



EXTRA TOUCHES given orchestra lighting utilized lumiline for ceiling cove and dazzling color effects in a niche.

Modernizing a Community Hall

EVERY town has one or more club rooms that serves for various social and fraternal functions. These places can usually be made more useful and inviting, when a bit of study is given to the lighting. Such an example is the recently renovated American Legion club room in Reading, Pa.

Here an inexpensive alteration of the ceiling was worked out to accommodate a new lighting scheme. This concealed the wiring for a new layout of outlets, to provide good general illumination for bridge parties, a choice of subdued lighting intensities for dances, 60-foot-candle down lighting

for special floor acts and an attractive lighting effect for the orchestra platform.

The complete lighting layout, as shown, was prepared by lighting engineers of the Metropolitan Edison Company and installed by the Electric Equipment Company of Reading. Dotted lines mark how a new panelled ceiling was provided to conceal existing beams and piping. The bevelled ceiling patterns enhanced the effectiveness of eight 500-watt indirect lighting units, which provide an initial general illumination of 18 foot candles.

Eighteen 100-watt flush ceiling units

are installed along the sides of the room. These are used during dances, when the main ceiling units are not lighted. Four 300-watt flush ceiling spot lights were spaced in a 6-foot square, for floor acts, in front of the orchestra platform.

The orchestra platform has a 12-foot hood, extending out 5½ ft. from the wall. A pleasing effect was obtained with 60-watt lumiline lamps, which were installed in a cove inside the hood. Corrugated niches back of the orchestra, employ alternate orange and green lumiline lamps. These five niches are 12 inches wide and 7 feet high, and lined with chromium corrugated reflectors. Vertical lumiline channels finished to match provide a concealed lighting source of dazzling colors reflected from the niches.

Other provisions included floor outlets in the platform for the orchestra's music stands and wall fan outlets with local switches directly below. Space was remodelled adjoining this 30-ft. by 65-ft. room to accommodate a new bar. Here a vaulted ceiling was cove lighted. Modern back-bar lighting and convenience outlets for appliances were also installed. To provide flexible control of various lighting intensities and effects, the layout utilized 14 branch circuits.

This arrangement may offer ideas for new lodge halls and community centers. But it is intended as a suggestion for improving the lighting facilities in existing meeting rooms.



DUAL SYSTEM of main fixtures for general illumination, and outer row of ceiling roundels for subdued light, serves for card parties or dances.

KEEP PACE WITH Air Conditioning

WHAT part should the contractor play in air conditioning? The rapid growth of this new phase of electrical usage is continually raising this question. In the opinion of Claire T. Smallcomb, Los Angeles electrical contractor and motor specialist, this new industry offers big opportunities to those who will specialize in ventilation equipment.

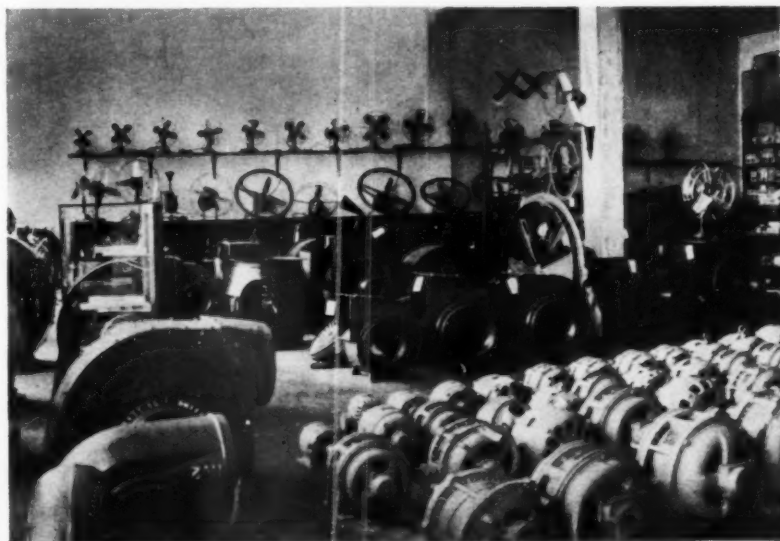
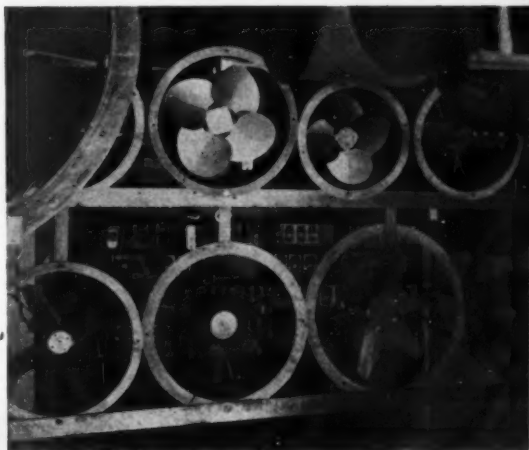
As the growth of air conditioning continues, designers of new buildings and remodelers of old ones, as well as plant managers are on the watch for methods of temperature control and air change and the electrical contractor who knows the ventilation business, and how to solve the practical problems, makes himself indispensable in any community.

Since 1919, Mr. Smallcomb has been interested in fans and in ventilation equipment. That interest he capitalized by becoming thoroughly familiar with all of its technical aspects. As a consequence much of the fan and blower

and floor display, where practically any fan in the place can be demonstrated in operation.

He believes that air conditioning responsibility should continue to rest with the designing engineer, but sees an expanding market for the sale of fans and air moving equipment, as a result of the publicity given to air conditioning. There is money to be made by the air-moving contractor.

EASY TO DEMONSTRATE—This rack contains nine kinds of commercial ventilating fans mounted and arranged to be plugged in and demonstrated.



business in Los Angeles has gravitated to him.

He is agent for standard and competitive grades of fan and blower equipment of national manufacturers, and keeps two ventilation salesmen on the payroll. Likewise, he makes a specialty of reconditioning and rebuilding blower and ventilating equipment. And as with the motor business, he finds this is a profitable side line.

Smallcomb's business has come as a result of effective and constant publicity. His show room combines a window display of fans and blowers

AIR MOVERS—Fans and blowers of various types are grouped together for ready inspection. Some are connected ready for operation on the display floor.

VENTILATION HEADQUARTERS—Claire T. Smallcomb of the Smallcomb Electric Co., keeps the front of his building well placarded, with moving displays of fans and blowers in the windows.



FLAT WORK DEPARTMENTS use power drives in various forms. Safety is a big item for starting and speed adjustments.

EVERY day is wash day in modern laundries. They range from small-town units serving the domestic trade, to large plants that cater to hotels or heavily populated areas. Then there are highly specialized layouts operated by hotels, hospitals, schools, asylums and even some industrial plants.

In all of these plants, the application of modern motorized machines, automatic and remote controls, electrically heated devices and scientific illumination has become steadily more specialized. When a new plant is built in your town or an old one modernized, the wiring must be laid out to take care of improved efficiency and profit in laundry operations. The owner seeks better quality, lower service costs and increased production and volume, to justify his investment.

In the modern laundry motors run into many sizes and types. Controls often perform special functions. Electrically heated units are subjected to constant service, sometimes with rough handling. There are damp and steam laden atmospheres, hot machines and rolls, and splashing water.

So the wiring must be able to take it. Complicated remote controls must be wired to give maximum safety and uninterrupted service. Electrically heated devices require ample copper to insure quick, even heat. High intensity supplementary illumination must be provided for the safety of workers, near ironer rolls and other dangerous stations. Good inspection lighting is also needed.

Chemical and textile research workers are constantly in collaboration with equipment designers to improve laundering technique. Therefore, modernization of existing plants is often a competitive necessity. To make possible the use of newly developed methods often places additional load upon the wiring system. Laundry layouts must be planned for their ultimate electrical loads.

As a guide to this planning the most common items to be checked for a modern laundry job are listed. If a re-wiring or lighting survey is to be made, these lists will be useful in your sales approach.



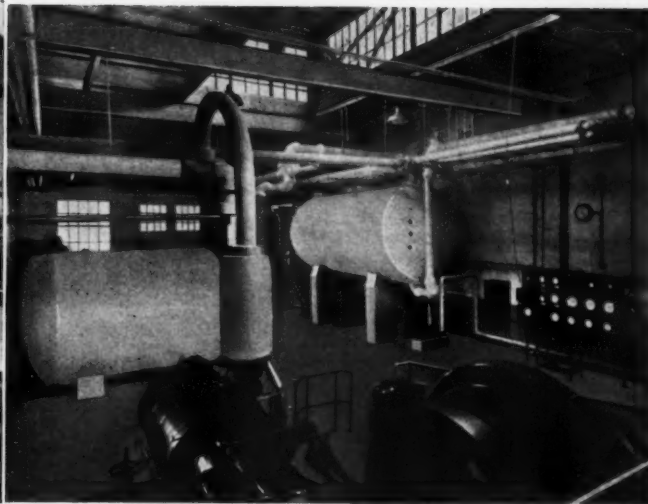
American Institute of Laundering

GOOD LIGHT and safe, dependable controls speed up as in the loading and balancing of this large centrifugal extractor.





WATER HAZARDS in the washroom make well planned wiring pay handsome dividends in low repair costs and freedom from circuit failures.



POWER SUPPLY is often generated from part of the plant's normal steam load. Regardless of source, the modern work areas are completely electrified.

You Wire a Laundry . . .

Fifth in a series on what to remember on different industrial jobs.

CHECK LIST FOR MODERN LAUNDRIES

MOTOR DRIVEN EQUIPMENT

Agitators
Blowers
Bosom Pressers
Carders
Centrifugal Wringers
Cafeteria Equipment
Clocks
Clothes Dryers
Collar and Cuff Irons
Collar and Cuff Starchers
Conveyors
Dampeners
Delivery Wagons
Door Openers (at Loading Docks)
Dryers
Edging Machines
Elevators
Extractors
Exhaust Fans
Fans, Ventilating
Generators
Heating Plant
Industrial Trucks
Mangles
Marking Machines
Molding Machinery
Monorails
Office Machines

Pressers

Pumps
Rollers for Collars, etc.
Scales, Electric
Seam Dampeners
Sewing Machines
Starch Cookers
Starch Extractors
Tumblers
Washing Machines
Water Boilers
Water Coolers
Water Softeners
Wringers

ELECTRICAL HEATING EQUIPMENT

Cafeteria Equipment
Disc Stoves
Flat Irons
Fluting Irons
Hosiery Forms
Ironing Machines and Rolls
Laundry Irons
Puff Irons
Ranges
Sleeve Irons
Steam Generators
Water Heaters

LAUNDRY SIGNALS

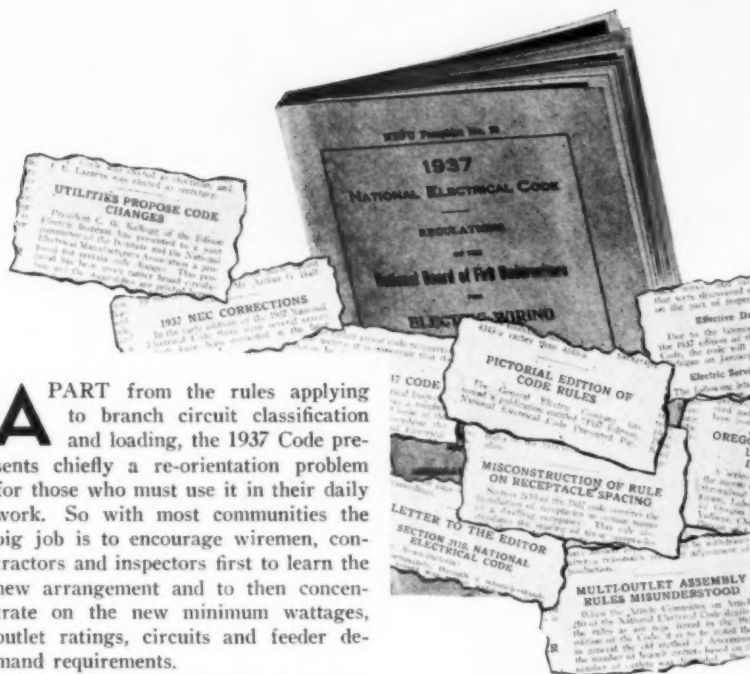
Annunciator Systems
Burglar Alarms
Bells or Howlers for Start and Stop
Signals
Code Calling Systems
Fire Alarm Systems
Push Button-Buzzer Call System
Tank Level Alarms
Telephone System
Time Clocks
Time Stamps
Watchman Systems

LAUNDRY LIGHTING

Color Matching
Exit lights
Flood lights
Inspection lights
Night lights
Signs

A general lighting intensity of 20 foot candles recommended. Supplementary lighting is desirable at locations which involve critical seeing. Dangerous work, such as at mangles and ironers, should have supplementary lighting.

A Round-Up on CODE ACCEPTANCE



A PART from the rules applying to branch circuit classification and loading, the 1937 Code presents chiefly a re-orientation problem for those who must use it in their daily work. So with most communities the big job is to encourage wiremen, contractors and inspectors first to learn the new arrangement and to then concentrate on the new minimum wattages, outlet ratings, circuits and feeder demand requirements.

Some enforcing authorities feel indisposed to require the number of outlets and circuits which the Code now makes mandatory. Others question whether it is their function to demand adequacy beyond the buyer's desire to pay. In contrast to this view, certain west coast communities have adopted higher supplementary rules for use with the new Code. Here is what some of the inspectors say:

New England—John M. Turnbull, Springfield, Mass.—

"The trade likes the new arrangement in the 1937 issue. The parts commanding greatest attention are those articles on branch circuits, appliances and motors. There are some matters difficult of interpretation and application, however."

"Branch circuits, Par. 2107 has been confused with Article 220, Feeders. The branch circuit rule calls for 2 watts per square foot while 1 watt per square foot is the requirement in the feeder section."

"Under Par. 2108, the right to demand so many circuits, and its application in rewiring jobs is questioned. The idea of allowing an unlimited number of outlets on a domestic circuit is questioned, especially by older wiremen. However, this new rule seems to be working well where applied."

"The Code still requires careful reading for intelligent application. Many people

During the past six months, after considerable discussion, many communities have adopted the 1937 Code. Here are reports on the progress and problems of Code users.

want to find answers in the Code with too little effort."

Metropolitan New York—F. N. M. Squires—

"There is very favorable compliance with the provisions of the 1937 Code in this territory. The greatest opposition has been to Section 2110, because some contractors felt that they can not force the builders into installing more receptacles than they desire. Our inspectors had to sell the builders that this requirement was a safety measure, as it eliminated cord hazards."

"Some also oppose Section 2357, in which the rating of service switches tends to penalize a small house for having more branch circuits than the Code minimum. Also the elimination of the 12-outlet rule and application of Sections 2107 and 2108 tends to create a crowding of outlets upon two circuits."

Central States—Ohio Inspection Bureau, Columbus—

"In this territory Section 2110 of the Code has provoked the most discussion. So

far many of the inspection authorities have found no satisfactory solution. Some municipalities contend that it is impossible to enforce a requirement which designates how many outlets a person must install.

"There is some confusion relating to store lighting circuits where 80 per cent is the requirement. The present Code does not meet the approval of workmen, because they are unable to find the rules they require."

Middle-Western Area—W. T. Stuart, Mid-West Editor, Electrical Contracting—

"The new arrangement and indexing in the 1937 Code has been acclaimed as an important forward step by inspectors and contractors in the Middle-Western area."

"The area method of calculating branch circuits is generally approved as it simplifies adding to established layouts."

"The growth of farm wiring activity has brought problems from the rural areas in regard to grounding in outbuildings, wiring methods in barns and haylofts and for conductors between buildings. Where the Code is not clear, some states have adopted supplementary wiring regulations."

Southern States—George Welman, Louisiana Rating and Fire Prevention Bureau, New Orleans—

"The new Code is entirely too cumbersome to enforce in full, especially adequacy and demand factors. Inspectors have no time to engage in such promotion work as adequacy and pay very little attention to it. All inspectors, naturally, recommend adequacy, but to enforce rules requiring a minimum number of outlets and circuits, is a horse of an entirely different color. If the inspector gets a reasonably safe job, it is about all that anyone can expect of him. Electrical standards have no place in a safety code and actually retard development rather than promote it."

Pacific Coast—Ralph W. Wiley, Chief, Department of Electricity, San Francisco—

"Article 210 of the 1937 Code is providing more discussion than any other section. We feel that this section of the Code is a commendable step in the right direction. This city requires three watts per square foot in residences. Many Coast cities require receptacles to be installed on No. 12 circuits, fused at 20 amperes, and separate from the lighting outlet circuits."

Under new section 2131 the only type of lampholders that can be installed generally on a 20 ampere circuit are the heavy-duty type. In our opinion, this step is not satisfactory since there is no difference between the plug caps and receptacles of a 15 ampere or a 20 ampere circuit."

Permitting unlimited numbers of outlets on circuits installed by floor area calculation is a step in the right direction. But the omission of the mandatory requirement of circuit limiting devices, such as circuit breakers or non-tamperable fuses, has somewhat nullified this provision."

Forever
Improved!



FAR more important than any individual unit of production, are the aims and standards of the manufacturer. Only a product "forever improved," only a manufacturer unceasingly active to better his product, can give the wholesaler and contractor the support which they must have.

There is little need to cite the record of Cutler-Hammer in this respect. In every field in which Cutler-Hammer has been engaged, it can point to a record of unceasing betterment, of pioneering achievements which have set new standards for the field.

This is exceptionally true in the case of safety switches and service equipment. CUTLER-HAMMER, Inc., Pioneer Electrical Manufacturers, 1306 St. Paul Av., Milwaukee, Wis.

Typical of the Progress
Cutler-Hammer has brought to Safety
Switches—Bulletin 4115 . . . Type A

1. Compact construction. The two-pole 20 Amp., 250 volt size measures only 6 x 4 x 4 1/2, thus can be mounted direct on machine working line appearance either above or alongside a small Cutler-Hammer Switch.
2. Ease of dismantling. The entire operating unit comes out upon loosening just two screws, promoting easy installation.
3. Dead front (the modern trend) with fuses in the front, terminals near the top, provide accessibility when changing fuses.
4. Sturdy, long-life construction. Contacts are silver-plated, double break; all metal parts cadmium plated. Construction prevents lagging, provides high interrupting capacity, excellent current-carrying characteristics and long trouble-free life.



Editorials

Earl Whitehorne, Editor

Choose Your Weapons Carefully

The secretary-manager of a Mid-West electrical association says the biggest barrier to rewiring sales is that contractors talk too much about wiring. Why not skip the technical details—Sezzee.

Too often a rewiring job represents to the contractor a jargon of construction technique, circuit runs, panelboard alterations, code rules, pipe and wire. But what about Customer Smith? What can he save or gain? Greater convenience, more light for the same cost, less danger of bumps or falls? Fight your battle with this kind of customer-interest ammunition. Keep your powder dry, and don't think out loud about technical details.

Used Motor Shortage

Believe it or not, stocks of small used motors are nearly cleaned out in the state of Minnesota. There can be but one answer—the rapid rate of rural electrification has been felt in the motor marts. Single phase motors from one-half to five horsepower are reported to be in heavy demand, while used stocks are nearly all cleaned out in these sizes. The true significance of the farmer's place in the electrical market has thus asserted itself.

And Not Some Day

It doesn't seem right—but nothing counts in business but getting the money. You estimate. You do the job. The customer says it's fine. But if he doesn't pay you when he should—it's nix.

So sell the terms of payment when you sell the job. It's just as important as the size of wire. It's just as

much part of the contract as the price. For if you agree to do the job at a definite time, why should not the terms of payment be equally definite?

It is just a matter of being fair to yourself as well as to the customer. And all it needs to make it so, is the courage to speak plainly and insist that the transaction shall be fair both ways.

Adequacy by Tons

No trouble about adequacy in big jobs these days. They measure it by tons—of bus bar, for instance. Big factories, office buildings may need 25 tons of bus to insure satisfactory voltage and capacity at all times.

So why be afraid of adequacy in little jobs? Perhaps it only means No. 12 in branch circuits instead of No. 14. And why not? It only takes a bit of simple selling. And it is just as important to the small job as these expensive tons of extra copper for the big customer. Protect them both and take your profit.

Combat Those Cord Extensions

Rental property is admitted to be a tough market for additional outlets. Owners protest that nobody will ever use all the outlets we want to install.

Yet in a "modern" five room apartment we recently counted sixteen carefully installed lamp cord outlets. The tenant was a handy fellow who hated trailing cords. Plugs were screwed to the baseboard and the cord wedged out of sight.

We can sit back and cuss about this situation. But something can be done that will sell this kind of wiring. Every time you run across a lamp cord extension job just draw a rough sketch of the room layout.

Show original outlets, cord extensions and furniture arrangement. Build up a file of these sketches. Then the next time you tackle a real estate firm for additional wiring bring out these proofs that tenants want more outlets.

Whose Inspections Are Acceptable?

Contractors occasionally rise up in protest against what they claim to be high costs of inspection fees. In some cases they have set up a private inspection bureau to operate in competition with an existing organization at lower rates. Chief complaint is that high fees hurt business, cause public to shop for bootleg wiremen, and generally dodge getting inspections wherever possible. But in setting up a rival inspection authority, the legal question arises as to who renders acceptable inspections.

In Reading, Pa., the Anspach Electric Company entered a complaint with the Pennsylvania Public Utility Commission, claiming that the local power company refused to connect wiring jobs which were inspected by a private inspection corporation. This company operated as a competitor to the Middle Department Rating Association. The Commission ruled that the power company would be required to accept certificates of inspection from the rival inspection organization as authority to connect wiring systems. Thus the rival inspections are placed on the same basis as those made by the Middle Department Rating Association or the municipal inspection bureau. This is a far reaching decision of vital concern to contractors.

Don't Forget the Yardsticks

The butcher has scales for weighing legs-o'-lamb, tailors tailor with a tape measure, optimistic fishermen carry scales, and even golfers' score cards are marked for measuring a stymie. So there are standards for bigger and better roasts, neater waistlines, whopper yarns or elusive trophies. For electrical men there are standards too. We mean our standards for good lighting, such as the recent "American Recommended Practice of School Lighting."

Today our industry indulges in too

wide a variety of lighting recommendations. In other words the contractor, wholesaler, manufacturer and power company have not yet all started talking one language.

In the meantime there is confusion, although a big lighting job is far from done. In 1933 a nation-wide survey of 1900 industrial plants in 182 cities showed average intensities to be 2.85 foot-candles. Between these low levels and accepted standards lays the big field of today's compromise selling. Why not adopt a uniform yardstick, talk the same lighting standards, and get bigger and better results for all concerned.

Round The Corner

A smart salesman, talking to a contractor the other day, suggested a 30 minute neighborhood tour to bird-dog new business. The contractor was skeptical.

"Well, around the corner," said the peddler, "is a shoe shop. Let's start there."

"What could that guy buy?" was the response. "He's only a cobbler."

They strolled around there and found a van backed up to the door. It was unloading a \$600 shoe fixing machine.

"You better hurry" said the salesman. "He might ask you to change his lighting, so he can use the new machine."

And round the corner in any town, these things are happening. And a 30-minute tour most any day will uncover business. But you have gotta go and look and you've gotta ask 'em to buy.

Tricky Salesmanship

Overnight forty dollars disappeared from the cash box in a Toledo chick hatchery. The next afternoon a stone hurtled through the open door. Attached was forty dollars and a note,—"I came through your back door last night so easy." A salesman called later to demonstrate burglar alarm equipment.

Quite a risk, to be sure, but here is one daring example of how to build up customer interest. We don't advise such sales technique but do believe more selling must be directed at the customer's pocket book or checking account. Money saved is still a powerful appeal.

Join the Family Circle

Electrical men, collectively, would do well to look in occasionally on the men who keep the wheels of our big industries turning. It would point out to them a lesson in cooperative salesmanship. Plant engineering and maintenance staffs must perpetually sell facts to hard-boiled executives. This family circle of plant men puts up a united front which wins appropriations for big modernization jobs. The same united front among electrical men would sell their wares more successfully.

And big plant men indirectly sell ideas to small plants for our industry. They set the example which lesser lights adopt, such as lighting, motor applications, control, distribution and so forth. The plant chiefs in Detroit's big auto plants say executives are still backward about maintenance. But with good cost records and exacting surveys—real factual data, they have sold a liberal budget for trouble prevention. So we too can look in on plant chiefs and get ideas for forming our own family circles.

Art Inspires Signalling

When Andrew Mellon bequeathed a \$19,000,000 art collection to the nation and topped it with a bequest for a National Gallery in Washington, these gifts totaled about \$27,000,000. Signal experts tell us the collection of Old Masters which the gallery will house has inspired them to new highs in the wizardry of electrical protective devices and theft alarms. But the experts won't talk—yet. Suffice to say that the works of Da Vinci, Rembrandt and others will rest secure against the craftiest international super-thievery. Another branch of electrical progress scores again!

Back Talk

Power Tools for House Wiring

To the Editor—"May I make inquiry if any contractors have been successful in developing a method of cutting in switch box openings in old house work, using power driven tools for the purpose. A device is needed that will make the two vertical cuts simultaneously, using an electrical driven saw with two blades set apart the width of a switch box. After the vertical cuts have been made the tool could be turned around and the horizontal cuts could be made, thus completing the operation.

"We have been in communication with manufacturers of various types of cutting tools without learning anything of value. Such a tool should be developed in view of the large number of such operations required in farm wiring and in modernization work in city buildings."

Leon Friedman,
Allen Electric Co., Detroit, Mich.

Mr. Friedman has raised an interesting point. Surely the wizards of the portable tool industry can work this one out successfully. After all, 22,000,000 old homes to be re-wired in years ahead by a large share of some 15,000 contractors, should provide enough incentive for inventive genius.

Thanks for a Large Order

To the Editor—"Have you considered maintenance in nautical fields such as yacht basins, boat builders, stevedoring operations, cranes and winches for boats, conveyors, loading and unloading apparatus on docks, etc.?"

Chas. Jorgensen, Chief Electrician,
Luckenbach Steamship Co.

No, Mr. Jorgensen, so far we haven't got around to nautical problems yet, perhaps at the risk of getting into deep water. And we don't mean it literally, altogether. But we're glad to receive your suggestion for future electrical maintenance topics. We might as well get our feet wet.

Jobber Indictment

To the Editor—"In your July editorial 'Behind the Beard' you seek to take the contractor to task, because he attempts to obtain materials at better prices. But the jobber is just as guilty of unfair practices."

This would have been a more potent article had you included an indictment of the jobber who is retailing electrical materials at wholesale prices to the consumer, and who has a "Wholesale Only" sign in the office, and is running out materials at the back door at wholesale prices to every Tom, Dick and Harry."

Robert J. Nickels,
Madison, Wisconsin.

Everyone knows that some wholesalers are stretching their "wholesale only" policy. But two wrongs won't correct the evil. After all, to clean up this situation requires contractor-wholesaler committees to come forth with cards on the table. It can't go on forever under vicious no-holds-barred rules.

A Contractor-Wholesaler Speaks

To the Editor—"I want to speak freely regarding your July editorial 'Behind the Beard'. Having conducted a wholesale department for years, we can see nothing wrong with this policy. But here is where I have a big kick coming and think that the contracting industry should kick loud and long. It has been the policy for a number of years for jobber's salesmen to visit the consumer trade and encourage them to buy their materials of the jobbers and do their own work. They supply engineering service by assisting the consumer and his maintenance man in making layouts.

This same practice is indulged in very largely by manufacturers. It was these practices that drove us, and perhaps many others, into the wholesale business. When we find we cannot sell a wiring job, then it is a case of making the best of a bad situation and taking a part of the loaf instead of the whole loaf."

G. M. Sanborn,
Indianapolis.

Here is a situation that has cropped up many times all over the country. Mr. Sanborn has met it in self-defense. But it is a different problem than the one we wrote about. Who knows but what the Robinson-Patman Act will be the gate that swings both ways, and finally curb both evils to the mutual satisfaction of all branches of the industry.

WIRING

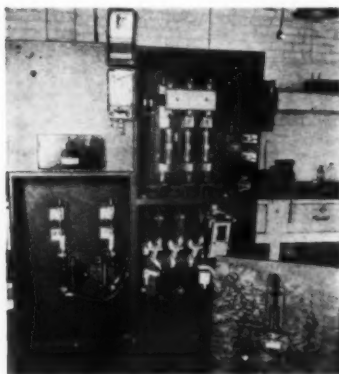
Methods

AUTOMATIC CONTROL FOR IRRIGATION

Backstrand Bros., of Riverside, Calif., sell and install time switch control for non-automatic water pumping plants. They also push control equipment for fully automatic pumping plants, operated by an irrigation canal company.

When a farmer wants water, it is necessary to run some of the deep well pumping plants scattered along about 20 miles of canals. With manual control there was waste of water and necessity for men on duty at all hours to start or stop the many pumping plants.

So A. A. Webb, engineer for the company, and Backstrand Bros. designed a portable rig, containing a time clock, transformer and relay, which



AUTOMATIC PUMPING panel sold to control flow of irrigation water.

could be hooked onto the panel of a switchboard. Control leads are attached to a connecting strip, and a fiber connecting plug is inserted. Across-the-line motors can be started automatically with this portable outfit. On the older plants having manual compensator starting, the rig can be used to break the holding coil circuit to stop the plant at a specified time.

Seven plants are now equipped with permanent automatic time control panels. The complete installation consists of a dead-front main line switch,

magnetic contactor, time switch and relay, time delay relay, transfer switch, hold button, 440/110 volt transformer and fuses. The time delay is used to hold the motor off the line on manual operation so that the current can't reverse. The time clock can be cut in by pushing down the hold button and switching the plant to the time clock relay. Since most of the pumps are water lubricated, a control on the water is first opened while the motor is on time delay, to permit water to enter the pump before the motor starts up.

PROVIDING ROADSIDE ADEQUACY

Speeding along New Jersey's super-highways, one passes many modern roadside inns—users of electricity in surprising quantities. The Gary Electric Company of Hackensack, N. J., recently wired a second unit for a chain operator of inns, and the accompanying photo shows what is required to provide adequate service and distribution facilities.

Here a 400-amp. switch controls three 4/0 underground service conductors, brought in 110 ft. from a pole in 2½-in. conduit. This is one of the first installations in the Hackensack area employing the utility's new type of current transformer cabinet, placed ahead of the service switch, with meter cabinet above the transformer cabinet.

At the right of the main switch is a feeder distribution cabinet with four

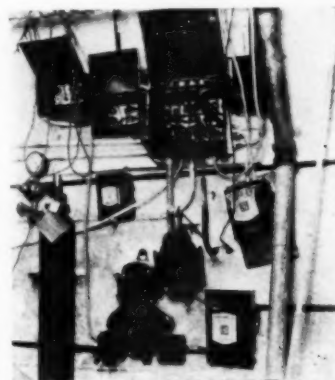


SERVICE ASSEMBLY—An arrangement with current transformers and meters located ahead of 400-amp. service switch.

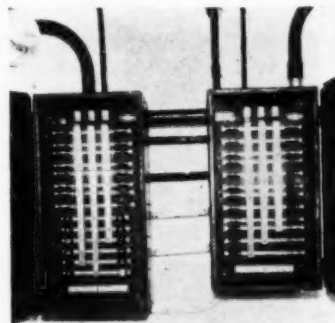
100-amp. and four 60-amp. circuits. The job has 24-circuit and 36-circuit branch panelboards for lights, heating appliances, fans and other motorized equipment. The installation also takes care of air conditioning loads for several dining room areas on the main floor.

BASEMENT FACELIFTING

We are indebted to the Bond-Lehman Company of Evanston, Ill., for these views of a basement installation taken before and after modernization. Usually the "before" version is expected to show a conglomeration of ancient



WIRE MESS—A basement gone wrong through amateur workmanship.



SAFE AGAIN—Clean-up jobs like this are needed in many basements.

wiring relics that have suffered from many years neglect and abuse. In this case, however, the wiring is of more recent vintage, but it became hazardous because of amateur additions and tampering. The question naturally arises as to how many thousand jobs of just this kind await correction in various communities.

Electrical Contracting, August 1938

Enclosed Switches

THE NEW "R.B.A." THEY'RE TALKING ABOUT



Here's a NEW COMPACT Trumbull heavy duty industrial switch line with all the time-tested features of the "R. B.", which it supercedes . . . PLUS many outstanding improvements.

The entire switch mechanism, for example, is mounted on a saddle . . . removable as a unit from the front of the box.

That saves time in installation and wiring . . . simplifies maintenance and replacement.

And see how Trumbull has combined the advantages of both side and front operation.

That new "front-side" operating handle on "R.B.A." gives you regular side hinged covers and at the same time permits close ganging.

New heavy cover catch and releasable interlock are additional safety and convenience features.

Of course you'll find "R.B.A." equipped with the famous "Vystipe" fuse clamps that prevent heating at fuse contacts . . . with silver plated roll contacts receding into arc-quenching chambers in the rugged, non-carbonizing moulded base . . . and with many other proved Trumbull quality features.

Circular Number 300 and the August issue of Trumbull Cheer still further describe and illustrate this new "R.B.A." line. If you have not received your copies please write us. "Cheer" now has 38,000 readers



The TRUMBULL ELECTRIC MFG. CO.

PLAINVILLE

A GENERAL ELECTRIC

ORGANIZATION

CONNECTICUT

NEW YORK • CHICAGO • CINCINNATI • DETROIT • ATLANTA • PHILADELPHIA • LONDON • NASHVILLE • SAN FRANCISCO • LOS ANGELES • SEATTLE

Motor Shops

CELL INSULATION CRIMPER

Fish paper is quickly crimped to fit all common sizes of armature and stator slots by means of a pair of hinged boards and adjustable creasing plates made up in the service shop of A. L. Brown Associates, Inc., of Worcester, Mass. This crimper is light in weight for use on any winder's bench. It was made of $\frac{3}{4}$ -in. oak using a base section 17 in. long and 8 in. wide. A narrow



PAPER CREASER—Hinged board, which crimps fish paper by pressing against steel strip, forms slot insulation of all sizes.

board is hinged to this base which is folded upward to crease pieces of fish paper against a steel straight-edge. The straight-edge provides clearance to slip fish paper underneath toward an adjustable stop provided on the flat base.

AIR GUN FOR STRIPPING

Air gun cutting tools are employed to cut the coils of cold stators that are stripped for rewinding at the R. A. Reed Electric Company shop in Los Angeles. After one end of the winding is cut away, the stator is heated in a furnace

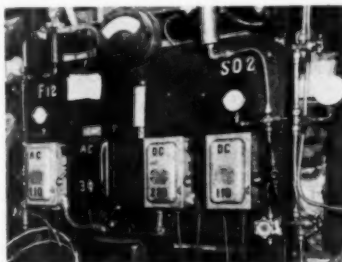


AIR-GUN CUTTING—Stator coils are cut away while cold for easy stripping.

at a temperature of 350 deg. F. to facilitate removing old coils and slot insulation. The coil-less frame is then sandblasted. In preparing for the installation of new coils, only enough filing to remove sharp edges and projecting burrs is allowed.

COMPRESSOR TESTS

When the S. J. O'Brien Sales Corp. of New York expanded its shop facilities to include the service of commercial refrigeration equipment, a large space was set aside for reconditioning the compressors. Here is the test board from which electrical and refrigerant lines are connected to units under test. While only two kinds of refrigerant are employed the compressor motors are apt



TESTS GROUPED—Board for testing refrigerant compressors and motor handles, Freon, SO₂, and five types of motor current.

to be d.c., 110 or 220 volts, 1 phase a.c., 110 or 220 volts, or 3 phase 220 volts. The motor test lines are separately controlled by safety switches located near refrigerant supply valves and gauges. An a.c./d.c. ammeter is centered on top of the test board.

COLORED TAG MOTOR IDENTIFICATION

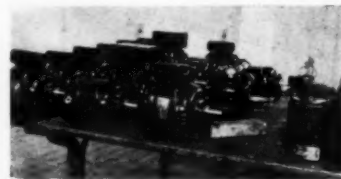
Where large stocks of rebuilt motors are shelved in various types, quick identification of each motor's principal characteristics saves time for the customer and the shop force. The Porter Electric Company, of Minneapolis, has adopted a system of colored paper tags to identify stock rebuilds.

Direct current jobs carry a green tag; single phase, repulsion inductive motors are designated by a red tag; yellow tags denote single phase capacitor; straw color split phase; and blue, three phase.

All tags warn the customer to check operating voltage and see that oil rings are in place and wells filled. The opposite side carries the company guarantee.

FACTORY SERVICE JOBS

A number of motor and small tool manufacturers route their service business to the I. R. Nelson Company Inc., of Newark, N. J. This means that rou-



FACTORY RECONDITIONING—A group of small motors in a service shop's factory service department.

tine service and adjustments on guarantee claims are handled for these manufacturers by this repair service organization. As a result, the customer avoids delays in corresponding with the manufacturer, while the Nelson Company also saves time and holds goodwill for the firms represented. This is a typical group of small motors which have been put through the shop. In some of these cases, customers have been taken care of with replacement units or parts.

Electrical Contracting, August 1938

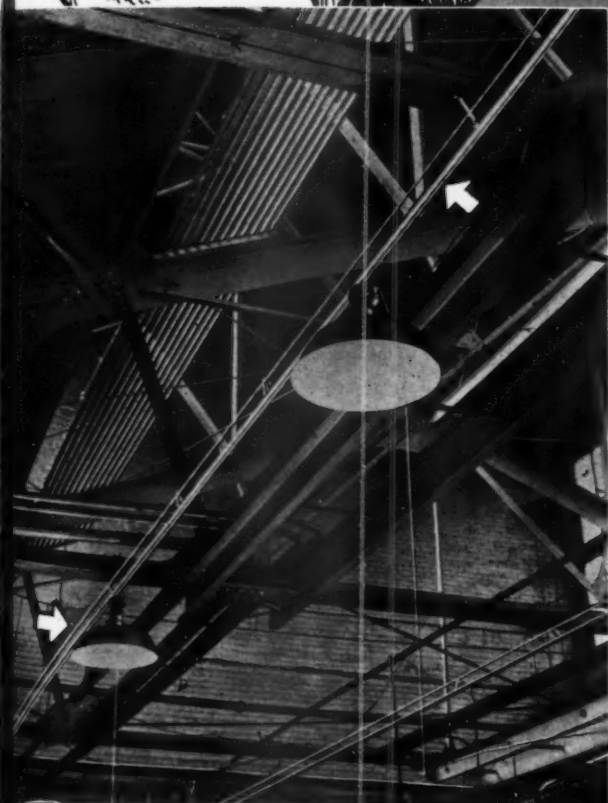
Pioneers of
Flexible Electrical
Distribution
Systems

BULL DOG UNIVERSAL TYPE

Trol-E-Duct

A FLEXIBLE SYSTEM OF
Mobile Outlets
FOR LIGHT AND POWER

"CAN LICK"
YOUR ELECTRICAL
DISTRIBUTION PROBLEMS



With its flexible Trol-E-Duct installation, this factory can readily move its light and power outlets or add new outlets almost instantly.

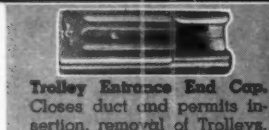
Let's look at facts. If you do not have a Bull Dog Universal Type Trol-E-Duct System in your plant today, every new electrical outlet required means a lot of expense and, what is often worse, considerable delay, with consequent production loss. But with Universal Trol-E-Duct (a pre-fabricated Wiring System, every inch of which is a potential outlet receptacle, with **movable** or **semi-fixed** current tap-off devices) new "loads" can be handled by simply plugging-in to the Duct ... And the **mobility** of the plugs, or tap-off devices, gives a flexibility which reduces the number of outlets that would otherwise be necessary.


BULL DOG
ELECTRIC PRODUCTS CO.

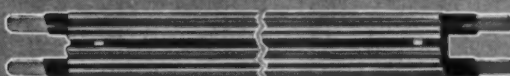
DETROIT, MICHIGAN

BULL DOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO, ONTARIO

Send for
pocket size
booklet:—
**How to Mobilize
Lighting and
Power Outlets
With
Trol-E-Duct.**"



Trolley Entrance End Cap.
Closes duct and permits insertion, removal of Trolleys.



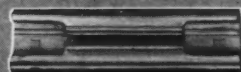
Standard Duct Sections.
Available in 1 to 10 foot lengths, can be joined by means of couplings to form a continuous run.



Feed-In End Cap. Closes duct end and provides a feeder means for the duct.



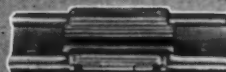
Movable Trolley.
Receptacle Type.
Card not included.



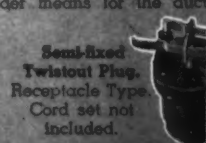
Plain Coupling. For ordinary joining of duct sections.



Standard Hanger.
Supports duct runs. Other types also.



Trolley Entrance Coupling. — means for inserting Trolleys.



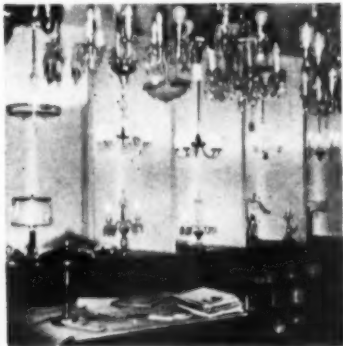
Semi-fixed Twistout Plug.
Receptacle Type.
Card set not included.

COMPLETE PRE-FABRICATED FLEXIBLE ELECTRIC WIRING SYSTEM

Better Lighting

FIXTURE DISPLAY

Half cylinder niches, along the walls of the Sterling Electric Company display room in Omaha, Neb. permits special fixtures to be separately demonstrated against a natural background,



SEPARATELY DISPLAYED in individual niches, special lighting fixtures can be demonstrated to the customer without confusing background.

without a forest of confusing units to distract the eye. Each niche of semi-circular cross-section, 24 inches in diameter, displays one suspended fixture and one bracket or table lamp. Separate toggle switches are provided and in demonstration each unit is separately lighted.

ALZAK REFLECTORS

"Alzak," is a new finish for aluminum lighting equipment. A number of equipment manufacturers have obtained licenses from the Aluminum Company of America to apply this finish in their own plants.

Diffuse reflectors are made from No. 1 Reflector sheet, etched and Alzak finished after being formed. Specular reflectors are made of No. 2 Reflector Sheet, first buffed, then cleaned, then given the Alzak finishing treatment.

Diffuse Alzak reflectors resist abra-

sion and can be readily cleaned to restore their initial efficiency. Depending upon the depth of the etching and the care with which the Alzak process is applied, these reflector surfaces have reflectivities from 72 to 80 per cent.

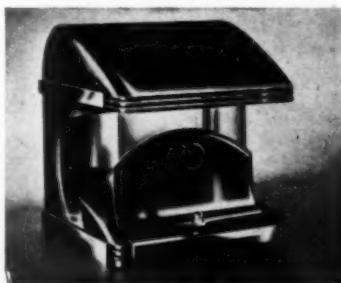
Specular Alzak reflectors, have a higher reflection factor than formerly obtainable from polished aluminum surfaces, in the range of 75 to 84 per cent. The aluminite finish on these reflectors protects the surface from injury, makes them readily cleanable.

Reflectors with both the specular and diffuse finish have been subjected to exposure tests in the laboratory, with salt spray, and outdoors under severe weather conditions. After such exposures when they have been washed by ordinary methods, the efficiency has returned to practically the initial value.

NEW GLARE PREVENTIVE LIGHT

A new type of illumination claimed to be completely free from reflected glare was recently shown at the New York Museum of Science and Industry. Polaroid Lighting, Inc., who introduced the first lighting unit of this type, demonstrated a Polaroid desk lamp. Optical and illuminating authorities speaking at the exposition referred to the lamp as the forerunner of a new era in illumination.

Light from an ordinary bulb is passed



FIRST Polaroid lighting unit.

through a sheet of this transparent Polaroid material to remove the light waves that cause reflected glare. Those waves or vibrations that are useful for seeing are not affected but the waves ordinarily reflected as white specular light or glare are eliminated. The effect on the printed page is said to be a startling clarity of detail unobscured by reflections.

Lighting equipment manufacturers will be licensed to use Polaroid in their products, but the first few products will be manufactured by Polaroid Lighting, Inc. of West Haven, Conn.

SELLING LIGHTING WITH DEMONSTRATION GADGET

Customers receive unit-by-unit demonstrations of better lighting equipment in one of the showrooms of the Batte Electric Co., at Norfolk, Va. Believing that customers become confused, when ushered into a fixture display room,



QUICK CHANGE FIXTURES—High-grade lighting fixtures are shown to the customer individually, by means of handy lowering equipment.

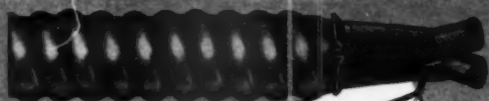
where the ceiling is crowded with all styles of equipment, a quick-change lowering device was provided which permits the showing of individual ceiling fixtures.

A lightweight chain is concealed in the wall and ceiling between the center fixture outlet and a pulleyed slot near the floor. When fixtures are in place the chain is fastened by a hook on the wall. To change fixtures the chain is unhooked, the lowered fixture unplugged and a new type raised in its place. The units to be shown are kept in a closet and are equipped with attachment plugs and stem loops, ready to be placed on demonstration.

HAZARD

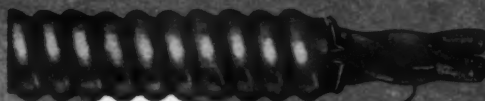
ARMORED CABLES

A Complete Line — Proven High Quality



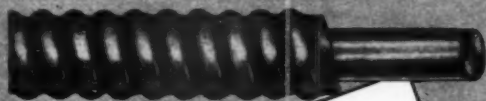
HAZARD ARMORED CABLE, Type AC

has a flame-resisting, moisture-proof paper sheath between the conductors and spiral interlocked steel armor. A ripcord beneath the paper facilitates installation. An insulating bushing is inserted at the cut ends over the paper sheath.



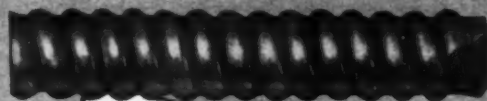
HAZARD ARMORED THERMOSTAT CABLE

has heat-resisting rubber insulation on each conductor, colored for identification, and armored for mechanical protection. Insures positive operation of control apparatus for heating and air-conditioning systems.



HAZARD ARMORED GROUND WIRE

with tinned copper conductor without insulation, armored for protection. The armor makes grounding assurance doubly sure.



HAZARD FLEXIBLE STEEL CONDUIT

is offered as a single unit. This strong but flexible conduit saves time and expense for short runs or where many bends must be made.

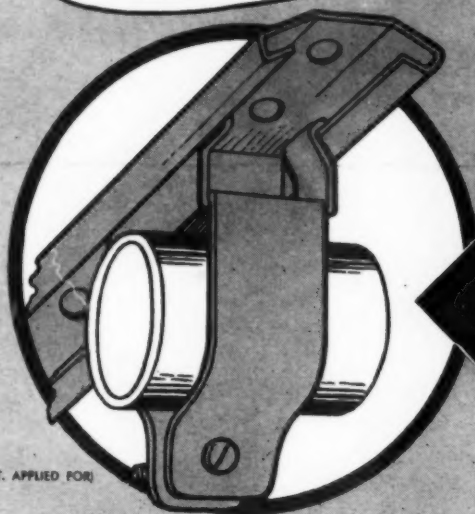
HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.
WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta  Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

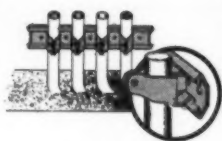
Announcing

**A REVOLUTIONARY
NEW METHOD
FOR HANGING CONDUIT**

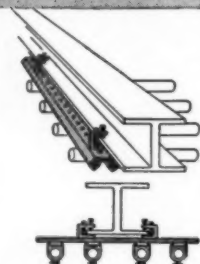


(PAT. APPLIED FOR)

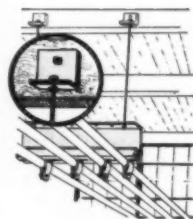
**The CLEVELAND
CONDUIT HANGER**
...FOR EASIER, QUICKER, NEATER
WIRING INSTALLATIONS



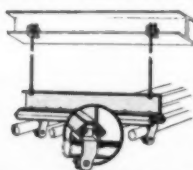
For supporting conduit to wall
when rising from concrete floor
for continuous stubbing up.



For supporting conduit directly to
steel beams, with conduits either
parallel or at right angles to beam.



For hanging conduit from
wood beams.



For hanging conduit from
steel beams.



For supporting conduit to concrete
ceiling or wall.

● Here's an item every contractor will welcome because it not only will improve the finished appearance of conduit wiring installations, thereby insuring greater customer satisfaction, but will greatly speed up the work, making lower bids and wider profit margins possible on all such jobs.

It is utterly simple in design (only one bolt fastens both conduit in holder and holder in position on rail), and is extremely flexible in use. It takes 1/2" to 4" conduit; rails can be quickly installed directly to, or hung from, concrete, wood, or steel beams; as many conduit holders can be slipped in as are required; and it can be used horizontally, vertically or at any angle.

Several applications of the *Cleveland Conduit Hanger* are shown here . . . enough, we feel sure, to convince you that it is truly superior (easier to install and neater in appearance) compared with all other methods of hanging conduit. But don't delay in finding out everything about it that will help you make more money! See your jobber immediately, or

FOR FULL PARTICULARS, WRITE:

CLEVELAND SWITCHBOARD CO.

2927 EAST 79th STREET

CLEVELAND, OHIO

IDEAS BUILT ON FUNDAMENTALS

WHEN new problems arise the safest solution is to go back to fundamentals. These articles were planned to provide the maintenance man with an essential background of fundamentals covering a wide range. Electrical equipment in the modern plant introduces many problems of selection, application and maintenance, therefore to cope with them successfully requires a liberal knowledge of the more important facts.

As industries change to new and better methods, so are changes made in motorization, control, and other essential applications. The maintenance man is expected to know what should be done with new problems, from his own fundamental knowledge. He may not have all the details in mind, but with a broad background, such as this "Check-up of Maintenance" provides, the job is made easier.

This series of articles began in January with a frank review of the electrical maintenance man's job. Then came—

1. ALTERNATING CURRENT MOTORS—Types and Applications
2. DIRECT CURRENT MOTORS—Types and Applications
3. ALTERNATING CURRENT MOTORS—Maintenance
4. DIRECT CURRENT MOTORS—Maintenance
5. A.C. MOTOR STARTERS AND CONTROLLERS—Types and Applications
6. D.C. MOTOR STARTERS AND CONTROLLERS—Types and Applications
7. MAINTENANCE OF CONTROL EQUIPMENT
(this issue)

Coming articles will discuss—

8. SPECIAL CONTROL PROBLEMS—Heavy Installations and their Maintenance.
9. ELECTRIC DISTRIBUTION—Circuit protection—Power Factor Correction
10. LIGHTING—Applications
11. ELECTRIC HEAT—Types, Applications and Maintenance
12. ELECTRIC WELDING—Types, Applications, Control
13. INTERPLANT COMMUNICATION—Types and Common Maintenance Problems
14. INSTRUMENTS—Types, Application, Care
15. POWER TOOLS AND APPLIANCES—Types, Application, Care
16. BATTERIES AND RECTIFIERS—Types and Maintenance
17. ELECTROPLATING—Maintenance Aspects
18. ELECTRONIC DEVICES—Types and Applications

Maintenance

MAINTENANCE OF CONTROL EQUIPMENT

THE very essence of control is that it be continuously effective and dependable. Therefore, the care of control equipment is vitally important, meaning inspection, cleaning, testing, replacing worn parts, overhauling and stocking of renewal parts.

For the immediate discussion, standard listed, or semi-standard control as used in industrial plants, commercial and office buildings will be considered. Maintenance of control for special applications, as for steel mills, rubber mills, shovels, mine hoists and the like will be treated in the next issue.

Selection

Maintenance begins with the careful selection of the control. From electrical and mechanical standpoints, some of the important factors, to be taken into consideration are—

- (1) Ample capacity to handle the current to the motor and for auxiliary equipment.
- (2) Functions that operate the motor according to a predetermined duty cycle.
- (3) Safety devices necessary for protection of the motor and operator.
- (4) Enclosures permitting proper location of the control.
- (5) Accessibility for inspection and servicing, especially when control is designed for mounting in limited space.

Inspection and Servicing

Systematic and periodic inspection and servicing is necessary to insure

efficient operation of control. The electrical maintenance man is acquainted with the frequency and conditions of operation, and he is the one to decide when inspections are to be made.

Good practice dictates that control operated four times a day should be inspected at least once a month. More frequent operations will require inspection and servicing every week or as often as once a day.

Every twelve months all control should be given a thorough inspection

RENEWAL PARTS stored in one place and neatly arranged for accessibility. (Westinghouse photo)





MAINTENANCE COSTS can be kept to a minimum by proper selection of equipment. Water-tight line starter and splashproof a.c. motor are used on this portable unloader. (Westinghouse photo)

and overhauling—to include (a) checking, adjusting, and renewing, if necessary, of main contact and interlock tips; (b) tightening loose connections; (c) cleaning all parts; (d) testing insulation and circuits; (e) lubricating bearings; (f) renewing oil in oil-immersed controls which are operated frequently.

At this point, it might be well to mention that the life of contacts under oil is 1/10 to 1/15 of contact life in air. Furthermore, in addition to shortening contact life, oil on contacts will sometimes cause contact welding, when copper contacts are used.

Cleaning

Where the control equipment is subject to dirt or dust, it should be cleaned, to prevent breakdowns of insulation, sticking of movable parts or to prevent wear. Various methods and solvents are used in cleaning.

Compressed air, of low pressure, dry, and free of oil, can be used to remove an accumulation of dust. The blowing out should be done so as not to drive the dirt into other parts of the apparatus, particularly if the dust should contain metal.

Solvents can be used if the dirt contains grease and oil. The most commonly used are benzine, gasoline, and carbon tetrachloride. The solvent should be applied sparingly, with sponge or rag, and the equipment thoroughly dried. The application of the solvents depends on the amount of fire risk involved and the amount of ventilation which can be obtained. Where fire risk is high, carbon tetrachloride should be used, but plenty of ventilation is required to prevent the operator being overcome by the fumes.

Overload Relays

Most overload relays have a thermal element connected in the power circuit to the motor. The heat from the element is transmitted to another part, which causes the relay to function and open the power circuit to the motor.

If the temperature where the motor is located is normal, around 25 deg. C. or 77 deg. F., then in order to determine the correct thermal element rating, the full load current as given on the motor nameplate is multiplied by 1.2. But if the temperature where the motor is located is above normal, around 40 deg. C. or 104 deg. F., then

the full-load current rating of the motor is multiplied by 1.1.

If the temperature where the starter is located is normal, 77 deg. F., then select an element nearest the calculated value. If, however, the starter is located where the temperature is above normal, nearer 104 deg. F., then select the thermal element with regard to the high temperature encountered. Each manufacturer has a multiplying factor to be used when various degrees of temperatures above normal room temperatures are found.

Where both motor and control are subject to so-called normal room temperature conditions, it is important that the elements be selected on the basis of a 77 deg. F. rating. Otherwise the motor will not have proper protection.

In solder ratchet types of thermal relays, a special eutectic type of solder is used, which passes quickly from a solid to liquid state. Failure of the relay to reset may be due to loss of solder, but no attempt should be made to resolder the ratchet of any solder type of relay.

In magnetic overload relays of the oil dashpot type, the time element is obtained by piston action in a cylinder, by-passing the oil through an orifice. Oil of the proper consistency should be used, as supplied by the manufacturer. Oil should be changed, foreign material removed, and the dashpot assembly cleaned to prevent sticky formations.

Overload relays should be checked when a controller is used with another motor, especially one of a lower rating, to insure proper motor protection.

Spare Parts

Controllers have several wearing and operating parts which require replacement. Frequency of operation and load conditions, of course, will determine the life of the parts.

The quantity and type of spare or renewal parts to be carried in stock is usually left to the judgment of the electrical maintenance man. Spares most generally carried in stock are:—coils, contact-making parts, springs and wearing parts. The following recommendations are given as a guide for quantities—

If five or less controllers of the same type and rating are installed, one of each of the renewal parts in stock is considered as sufficient quantity, except that this number should be increased to quantities sufficient to completely equip a single unit.

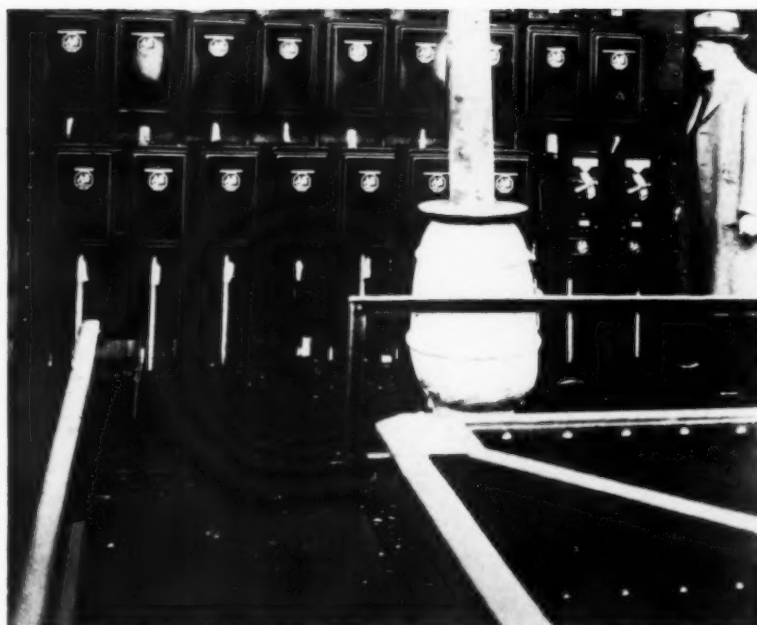
For total quantities above five controllers, the number of renewal parts should be increased in proportion. For remotely located installations or where

REMEDY	NOTE	CAUSE	SYMPTOM	REMEDY
Check and adjust spring pressure	6	Excessive heating		

TROUBLE CORRECTION CHART FOR A.C. AND D.C. CONTROL

SYMPTOM	CAUSE	NOTE	REMEDY	SYMPTOM	CAUSE	NOTE	REMEDY
1. Control devices do not close	No Power Low voltage Loose connections Broken wiring Open connections Contacts fail to complete circuit Defective coil Overload relay contact latched open	C C A C C C C C	Trace power source; renew faulty fuses Check power-voltage supply; if chronic, check wiring adequacy Check for low power factor Examine and tighten all vulnerable connections Locate with test equipment and repair Locate with test equipment and repair; remove any dirt from overload contact See No. 11 symptom for details Replace with new coil Operate hand or electric reset	Contacts welded together (continued)	Excessive bounding of contact tip on closing Contacts close without enough spring pressure Sluggish operation Rapid momentary touching of contacts without pressure	C C C C	Check and adjust spring pressure Replace worn contacts or weak springs; check armature over-travel See No. 3 symptom for details Smooth contacts and operate "inching" control button less rapidly
2. Control devices do not open	Interlock does not open circuit Holding circuits completed through grounds or other circuit defects Contacts welded together Misalignment of parts apparently held closed by residual magnetism	C C C C	Check control wiring circuit Trace with test equipment and repair See No. 7 symptom for detailed remedies	8. Control contacts get too hot	Inadequate spring pressure Contacts overloaded Dirty contacts Ambient temperature too high Chronic arcing Rough contact surface Continuous vibration when contacts are closed Oxidation of contacts	C C C C C C	Replace worn contacts; adjust or renew old springs Check load and apply correct size contactor Clean and smooth contacts. See No. 9 symptom Apply larger control device Adjust or renew arc chutes; if persists, consult manufacturer Clean and smooth contacts; check alignment Change or improve mounting
3. Sluggish operation	Spring too strong Low voltage Operating in wrong position Excessive friction Rusty parts, due to long idle periods Sticky moving parts Misalignment of parts Short circuits	C C C C C C C C	Adjust for proper tension Check power voltage and supply circuit conditions Correct the mounting position Test movement by hand for free swing; clean pivots; align parts Clean or renew parts Clean off all oil and dirt (bearings need no lubrication) Check for alignment to reduce friction Use test equipment and renew defective part or repair wiring	9. Excessive arcing at contacts during operation	Arc not confined to proper path Insufficient contact pressure Slow in opening Faulty condenser or connection Faulty blowout coil Excessive inductance in load circuit	C C C D C	Keep clean; use oil-immersed contacts; reduce excessive temperature Adjust arc chutes; renew if worn; consult manufacturer Adjust spring pressure; renew contacts or springs if needed Remove excessive friction; check tension and renew spring if needed. See No. 3 symptom Replace with new one if used Check connections Check load condition and consult with manufacturer
4. Erratic and undesirable operation causing (a) closure when not wanted (b) failure of overload protection (c) inability to sever power supply	Snack circuits Grounds Loose connections	C C C	Test and repair Tighten all connections; remove any vibration or rapid temperature change conditions	10. Contacts pit or corrode	Too little surface in contact Service too severe Corrosive atmosphere Continuous vibration of contacts when used Oxidation of contacts	C C C C	Clean and adjust Check load and apply larger size Enclose control; in extreme cases use oil-immersed contacts Change or improve mounting to stop vibration Keep clean; use oil-immersed contacts; reduce excessive temperature
5. Excessive collection of dirt and grime	High humidity Extremely dirty atmosphere Oil on control devices Excessive condensation Covers do not fit	C C C C C	Use oil-immersed control Use oil-immersed control or dust-tight enclosures Clean and do not re-coil parts Avoid rapid temperature changes; use oil-immersed equipment Re-align cover and check fastening	11. Contacts of control device fail to complete circuit	Excessive oxidation of contact surfaces due to long idleness or high operating temperature Inadequate contact pressure Open circuit elsewhere	C C	Clean and dress contacts; if caused by chemical fumes or salty atmosphere replace with oil-immersed control Renew contacts; check spring tension Check circuit wiring
6. Control coils overheat during operation	Shorted turn in coil Excessive room temperature Poor ventilation High voltage High current Loose connections Dirty conditions Operating on wrong frequency DC coil applied on AC Too frequent operation Open armature gap	C C C C C C C A A A A	Replace with new coil Apply larger control; consult manufacturer Relocate control; use forced ventilation Check for shorted resistor; check line voltage Check rating of coil; high line voltage Examine and tighten connections; check for undue vibration or rapid temperature changes Clean periodically; enclose control. See No. 5 symptom Apply coil for the frequency being used Replace with proper AC coil Apply larger control Test spring tension; remove excessive friction or any blocking substance in gap Check load conditions and apply larger contactor Smooth up contact surface to remove concentrated hot spots	12. Noise: (a) control hums, (b) control chatters 13. Control vibrates after repairs (also see noise)	Poor fit at pole faces Broken or defective shading coil Loose coil Worn parts Misalignment Loose mounting Bearings out of line Wrong coil used Too much play in moving parts	A A A A A A A A	Realign and adjust pole faces for proper contact Renew If right size, shim coil until tight Renew with original manufacturer's parts Realign Tighten bolts Lime up Replace Test and shim for proper clearance
7. Contacts welded together	Improper application Excessive temperature	C C	Check load conditions and apply larger contactor Smooth up contact surface to remove concentrated hot spots				

NOTE: A = Remedy applicable for a.c. control D = Remedy applicable for d.c. control C = Remedy applicable for both a.c. and d.c. control



CENTRALIZED CONTROL provides accessibility for maintenance of motor starters in a coal mine tippie. (Allen Bradley photo)

controller operations are exceedingly frequent, the renewal parts should be increased.

Trouble Shooting

One of the jobs of the electrical maintenance man is to determine the reason for shut-down or non-operation of the control and to correct the trouble. If a motor does not operate properly when a push button or other control device is operated, in a broad sense, any of the following may apply: overload, defective wiring between motor and control, defective control apparatus, defective motor, or abnormal line condition.

To restore service, it is recommended that the following tests and checks be made—

Overload—Inspect motor and control to see that voltage and frequency agree with the power supply, and that the control and motor ratings correspond. Check the voltage at the line terminals, between phases, and through the control to load terminals.

An investigation of methods and conditions should be made when undue overload tripping is encountered. Before resetting the overload relays or fuses determine that the correct setting of overload or size of fuses has been in use. Under no conditions should the overload thermal element or fuse size be increased beyond the recommended rating.

Defective wiring between motor and control—If motor fails to operate properly, inspect and test for open, grounded

or shorted circuits. Excessive vibration may cause open wires, loose connections, loose terminals and abrasion of insulation. Remove water, oil and cutting compounds which are destructive to insulation. Wiring should be installed and arranged in a manner to be protected against such hazards and should be of the proper size and have the correct type of insulation.

Defective control apparatus—Check for tight or worn bearings, poor alignment, excessive wear, dirt and oil, loose connections, worn contacts, broken shading coils, defective overload devices, open coils and shorts, opens or grounds of internal connections. Consult wiring diagrams for specific details.

With magnetically controlled apparatus, check push buttons, other operating accessories and wiring between accessories and starters. Clean magnetic pole faces with cloth and solvent. Dress copper contacts with sandpaper (not a file) to remove oxides and high points. Entirely smooth surfaces are not necessary for successful operation.

Replace contacts worn to a point where contact pressure is reduced below a safe value, otherwise welding will occur. Silvery alloy contacts do not require dressing or filing. Replacement should be made only when all of the silver alloy material is gone.

Coil tags should be checked with control circuit voltage and frequency. They may be different from line ratings because of separate control circuits, as from a transformer or a separate source.

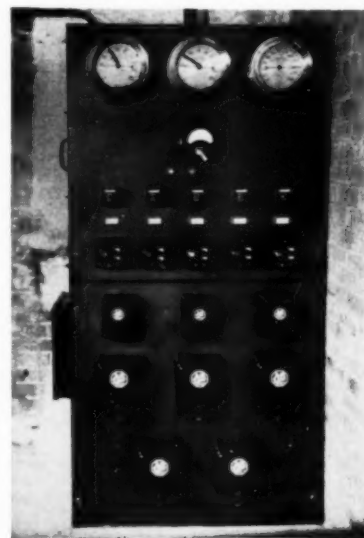
Defective motors—Check for worn, tight or broken bearings, jammed oil rings, improper lubricant, excessive thrust due to tight belts, misalignment of coupling or gears. See that motor is free of oil, dust, moisture and metal chips, and is properly ventilated. Centrifugal switches should be checked for freedom of operation and to see that contact is made and broken properly.

For other causes and remedies see Trouble Correction Charts on A.C. and D.C. Motors in April and May, 1938 issues, respectively.

Abnormal line condition—Variations from normal voltage, such as high or low voltage, should be corrected. High voltage conditions are usually beyond the control of the maintenance engineer. They should be corrected at the source of power supply and maintained at a value very close to normal voltage. Low voltage conditions may be due to overloaded feeders, poor connections or high resistance connections. Any variation in excess of ten per cent above or below normal voltage should be considered excessive, and requires correction.

Single phasing of polyphase motors due to fuse blowing, broken wires, high resistance or other causes may be encountered. This may cause motor overheating and burnouts. Proper selection of thermal elements on overload relays and the proper setting of overload devices will protect the motor against this condition by disconnecting it from the line before failure occurs.

Additional information on correcting trouble with control will be found in the Trouble Correction Chart for Control, on page 31.



STANDARD motor starters and push buttons mounted on one panel, simplifies maintenance. (Allen Bradley Photo)



TO VALUABLE OPERATING FACTS



Find out the facts that only instruments can tell about motors and electrical circuits — easily, economically, **INSTANTLY!**

Westinghouse Type "S" Sockets for instruments give you low-cost *instant* access to vital operating information about your power and lighting circuits. In a minute or less you can plug in the required Westinghouse Socket Instrument to obtain facts enabling you to correct low power factor, overloaded or underloaded motors, electrical leaks, faulty process

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With Type "S" Sockets installed in the power circuit conduit, simply remove the socket cover plate and plug in *any* instrument for *either* permanent use or test purposes. Send today for full information. Westinghouse Elec. & Mfg. Co., Dept. 7N, East Pittsburgh, Pa.

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• Easy to Bend and Rebend

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• 3 Simple Fittings



• Knurled Inside Surface

• Uniform Corrosion-Resistance

• Easy to Install

• Universal Acceptance

• Low Cost

• Widespread Distribution

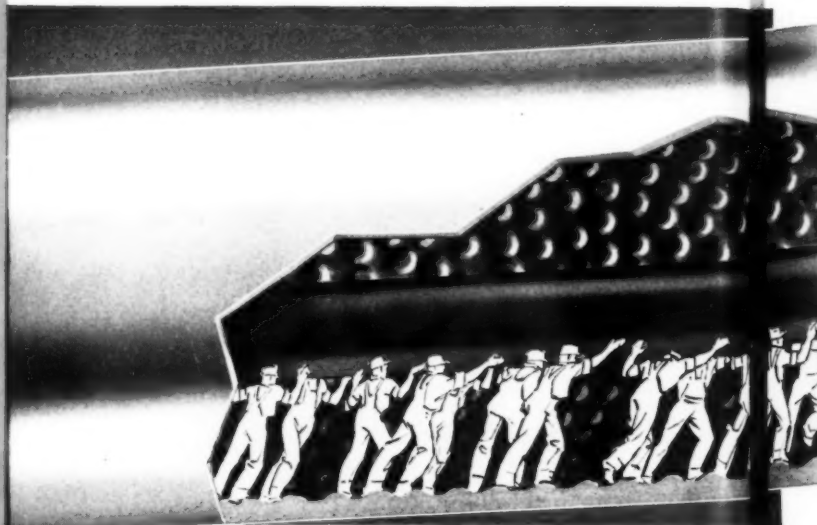
• Assistance of a Field Force



*Knurled inside finish (Patent No. 1,963,876)
available in 1/4", 3/4" and 1" sizes.*

**ACTUAL TESTS SHOW THAT PA
INSIDE SURFACE PLUEW**

Makes Wiring



Here is why wires can be pulled or pushed so much
easier through **ELECTRUNITE STEELTUBES**

Inside every length of **ELECTRUNITE STEELTUBES** in 1/2, 3/4, 1-inch sizes are thousands of little helpers—tiny round knobs rolled into the steel. Coated with a *new*, clear, non-flaking lacquer that provides a smooth, fast-sliding surface, these little knobs lift cables away from the wall—reduce friction and drag—reduce tendency to jam at bends—enable cables to glide along with the ease and speed of ball-bearing action.

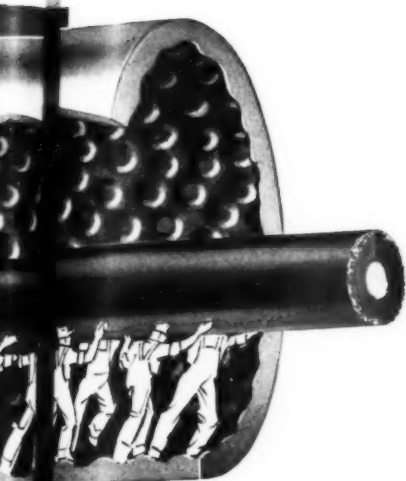
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THE PATENTED STEELTUBES KNURLED
 WITH A NEW CLEAR LACQUER COATING—

Pulling Easier



ELECTRUNITE STEELTUBES—
 the modern, low-cost raceway
 for wiring—makes wire pull-
 ing and wire pushing easier.
 Comparative tests have demon-
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 you to use ELECTRUNITE STEEL-
 TUBES—the easy wiring con-
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CLEVELAND, OHIO

SUBSIDIARY: REPUBLIC STEEL CORPORATION

Steel tubes

10,000 FEET INSTALLED!





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No wonder the men who know think so much of the Insulation Incorporated Service and use the CATALOG. They don't have to guess or worry or take chances—they know that here is a dependable source of supply at all times, that the service is prompt and sure, that they get the highest quality products, and that it pays them to order from Insulation Incorporated. Naturally men are all ears to good ideas—that's why we are getting so many new customers.



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INCORPORATED** 2127 PINE ST., ST. LOUIS, MO.



Thread 'em all with 1 Set of Chaser Dies

in this speedy bother-saving
RIGID No. 65R

Only 4 chaser dies instead of 16—and they stay in the threader. No bother changing, no extra pieces to lose. Saves you time and expense!

Just a quick shift of the setting post and this No. 65R is ready to cut perfect threads on 1" to 2" pipe, any metal, all thread variations. Saves you work!

Speedy new style work-holder clicks to pipe size, tightens with one screw. No bother with bushings!

You like the "feel" of this tool, the handsome appearance that inspires pride and care, the many features that give you faster easier threading—and real economy, as thousands of users can tell you.

Buy from your Supply House

The Ridge Tool Co., Elyria, Ohio

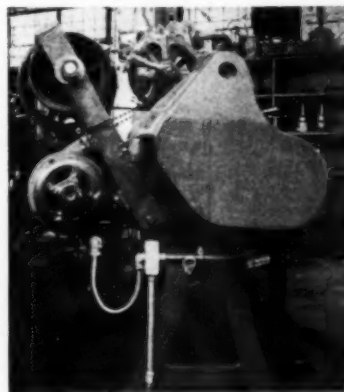
RIGID PIPE TOOLS



To Make Room for a Crane

All overhead shafting had to be removed to provide better lighting and make room for an overhead crane in a New England motor repair shop. This meant that machine tools had to be moved to other locations and equipped with individual motor drives. Two methods for providing drives are of interest.

As one 16-in. lathe had no provision for mounting a motor, an arc-welded frame was made and pivoted at the bottom to the lathe. The 1-hp., constant-speed motor drives a cone pulley through two V-belts. Drive from the cone-pulley to the lathe is by flat belt,



ARC-WELDED FRAME, pivoted at bottom, makes possible individual drive for a lathe which had no provision for motor mounting.

which is kept tight by the weight of the motor on the pivot. A small reversing drum switch for motor control was mounted on the front of the lathe.

A clutch-operated shaper was arranged for belt-drive from a counter-shaft supported by an angle-iron frame against the wall. The bearings are provided by inverted hangers. V-belts are used between the counter shaft and the 1 hp. motor which is on the floor.

Detachable Relays

There has been a great improvement in the manufacture of relays used in low-tension signaling systems. But there is always the possibility that the relays may require adjustment, repair and even replacement as the system becomes older.

Many relays are used in lamp-annunciator systems. Therefore, when such a system is being considered, thought should be given to the use of relays of the separable or detachable type. These relays are mounted on

small individual panels, instead of one large panel. Each relay has contact pins extending through the rear of its individual panel, and these pins are made to fit into receptacles, which are provided with the proper terminals for connection to the system wiring.

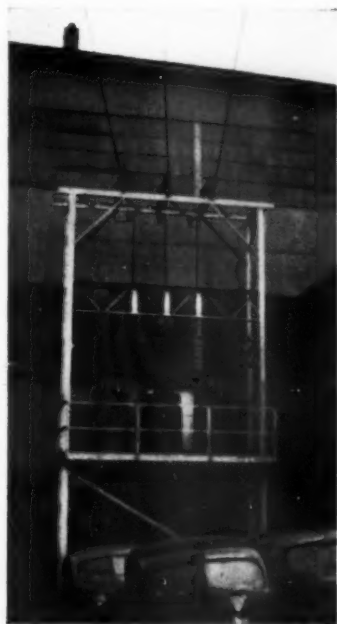
With this arrangement, it is unnecessary to disconnect any wiring. Any relay may be lifted from its position. It may be replaced with another similar relay while the first relay is being repaired. This feature enables a circuit to be placed in operating condition promptly.

Novel Substation Saves Space

Because of a steady expansion of plant facilities, space was at a premium in the plant of the Hazel-Atlas Glass Co. at Washington, Pa. When a new department was added recently, engineers were faced with the problem of building a substantial new substation without using any more of the valuable ground than was absolutely necessary.

The requirements were for a station to supply 300 kw. at 440 volts 3 phase to the new production department, stepped down from West Penn Power Co.'s 2,300 volt service. To do this it was necessary to provide for a dead-end tower, three 100-kva. transformers, a 3-pole gang-operated disconnecting switch, high and low tension buses, and lightning arrester.

Under ordinary circumstances, this equipment would have been mounted on



FABRICATED steel tower serves as substation and requires little space.

Electrical Contracting, August 1938

It Must NOT Swing as It Spins . . .



THE rotor of every Fairbanks-Morse motor must prove itself in *dynamic balance*. Complete with shaft and bearings, each rotor is spun while suspended free to swing. With a scriber, the inspector makes certain that it does *not* swing as it spins.

Every process in the manufacture of F-M motors is subject to the same relentless vigil. *Each* motor must pass a multiplicity of tests . . . not just an occasional motor. These rigid standards in our plant mean extra years, extra service in yours. Write Department 24, Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill. 35 branches at your service throughout the United States.

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Motors

FOR PROFITS IN WIRING CONTRACTS



PREST-O-LITE

TORCHES and SOLDERING IRONS

These torches and soldering irons supply proper heat for neat, rapid, economical installation of wire and cable. The torches, for open-flame work, produce instantly a concentrated, exactly controlled flame of high temperature. The soldering irons, for enclosed-flame work, can be kept constantly at a desired heat.



These appliances use Prest-O-Lite Gas—which is convenient, economical, and obtainable at thousands of Prest-O-Lite Gas Exchange Service Stations.



Your jobber will demonstrate Prest-O-Lite Torches and Soldering Irons. Call him—or write the Linde office near you.

The word "Prest-O-Lite" used herein is a registered trade-mark.

THE LINDE AIR PRODUCTS COMPANY
Unit of
Union Carbide and Carbon Corporation
New York and Principal Cities
In Canada:
Dominion Oxygen Co. Limited, Toronto

a wooden pole braced with heavy guy wires, but space limitations made this type of construction impractical. The fabricated steel tower with elevated transformer platform, was designed by the Hazel-Atlas engineering department. The cost, erected, was slightly more than the convention wood structure.

\$550 Investment

Returns \$445 in One Year

It cost the General Ice Cream Corporation approximately \$550 to install two capacitors for improving the power factor of its plant at Pawtucket, R.I. Prior to this installation, low power factor had resulted in extra charges of about \$181 annually under the low-power-factor clauses of the company's contract.

Last year, the capacitors gave power factor from 97 to 100 per cent, so that instead of paying an extra amount the corporation enjoyed power-cost reduc-



INTERMITTENT USE of 40 kva. capacitor keeps plant power factor between 97 and 100 per cent.

tions amounting to \$264. Thus, a fair estimate of the return on the investment of \$550 would be \$181 plus \$264, or \$445.

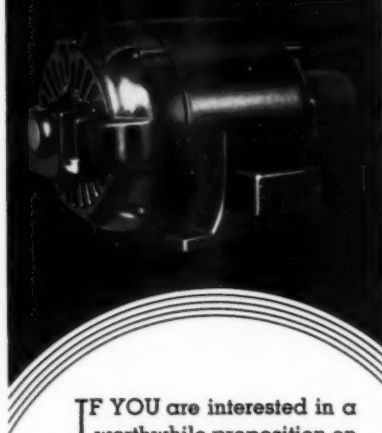
The two General Electric capacitors installed are rated 5 and 40 kva. The 5-kva capacitor is on the line continuously, while the 40-kva equipment is switched on, or off, as desired, by means of an a-c magnetic switch.

Adjustable Lighting Fixtures

Supplementary or localized lighting is necessary for detail work. To direct the light on the working surface from any angle, fixtures are available with adjustable arms and reflectors that provide uniform and high-intensity lighting over a restricted area.

MOTORS

*"That have what
it takes"*



IF YOU are interested in a worthwhile proposition on motors "that have what it takes" come to Peerless.

For more than 43 years Peerless has stood for quality electrical equipment and leading manufacturers of motor driven devices are using Peerless motors because they have confidence in them. They have found through test and experience that these motors carry the load with plenty to spare. You can rely on Peerless.



The Peerless

ELECTRIC COMPANY
WARREN, OHIO

Testing Accuracy Increased

Keeping the atmosphere as clean as possible in test location was found by one manufacturer to greatly increase the accuracy in testing. So special testing booths were constructed in various parts of the plant. They were served with cool, clean air by a duct system from a central conditioner.

The instruments and devices were found to operate more satisfactorily under these controlled conditions. Also, the workers are more accurate and alert because of the improved working conditions.

Safety First With Test Fuses

Primary fuse cutouts are used either on the crossarm or on the outside of the motor house, to protect a 2400 volt motor, and also to serve as disconnects. There is a considerable



SMALL FUSES may be used in fuse cutouts for test purposes after a "blow-out." If they do not blow, regulation size is inserted for normal operation. Fuse cutouts on crossarm serve also as disconnects when cover of housing is opened.

disturbance if a renewed fuse blows, when it is put in service, unless the short has been removed.

These fuses are enclosed in a wooden or porcelain housing. The fuse holder is fastened to the cover, which is hinged at the bottom. When the cover is opened, the circuit is



**BULLETIN
6013
A. C.
STARTER
IN
EXPLOSION
PROOF
CASE**

**Designed in
accordance with
Underwriters
Specifications
for Class I,
Group D
Hazardous
Locations.**



Note those wide Cast Iron Flanges, accurately machined. The cover, equally sturdy, has a reset button and the entire case is coated with a special acid-resisting finish.

The rolling, wiping motion of the Contactor points insures clean contacts at all times.

And that Bulletin 7322 Thermal Overload Relay with an established record of efficiency, is making new records of successful operation in places requiring explosion-proof protection.

For further facts, phone, write or wire our nearest office.



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It's A Quick Easy Job



Write for catalog giving complete listing and all necessary data on Bunting Bronze Bearings constantly carried in stock for electric motors.

GET those old motors ready to run. Replace worn bearings with Bunting Bronze Bearings available from stock for replacement in all makes of motors from 1/50 hp to 100 hp. They always fit, for they are machined in every detail to meet the exact requirements of the motors they service. Replacement is quick, easy and inexpensive. The Bunting Brass & Bronze Company . . . Toledo, Ohio. Warehouses in All Principal Cities.

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**WHITEZINC FINISH
CONNECTORS
and
COUPLINGS
for Electrical Metallic
Tubing**

A really simple method

Contractors can pocket the savings they make with B-M Connectors and Couplings. They save time, eliminate complicated installation trouble, and are really simple to use. Two squeezes on the handle of the B-M Indenter and the Connector or Coupling is attached securely to the Electrical Metallic Tubing. Investigate now for better jobs and more savings on each job.

We have patented our tools and method of fastening fittings to the tubing and limit the license of our tools to the installation of our fittings only.



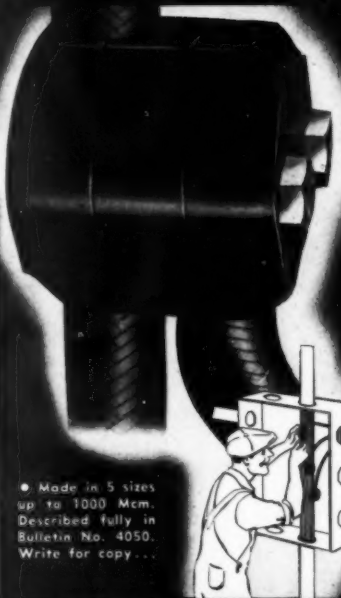
BRIEGEL METHOD TOOL CO.
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GALVA, ILLINOIS

No. 605 B-M INDENTER



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BURNDY TAPIT *Insulated Gutter Tap*



Made in 5 sizes up to 1000 Mm. Described fully in Bulletin No. 4050. Write for copy . . .

BURNDY Engineering Co., Inc.
459 E. 133d St. N. Y. C.

broken and the fuse and holder are disconnected from both sides of the line. A metallic fuse is enclosed in an expulsion chamber, which forces out the molten metal and extinguishes the arc, when the fuse blows.

Whenever a fuse blows, a careful inspection should be made to determine the cause of the blowout. Sometimes it is simply a case of overload, but this can not be known definitely. After repair work, instead of refusing with the standard size of fuse, which may be from 25 to 100 amperes, a test fuse should be used. These have the same type of expulsion chamber as ordinarily used, but have only a two-ampere fuse instead of the regular size link.

If the short is still present, the small fuse will blow without causing more damage and with no danger to the operator. If the small fuse holds, it is a sign that the circuit is O.K. The test fuse can then be removed and the regular size placed in the clip and the cover reclosed.

Even Lighting for Cramped Space

Cramped space in the Pepperton Cotton Mills, Jackson, Ga., presented an unusually difficult lighting problem for the Jacquard looms. A high level of de-



MERCURY LAMPS set at an angle of 45 deg. provide lighting for detail work in limited quarters.

tail-revealing light and even, general illumination was obtained by an installation of mercury-vapor lamps. The lamps were suspended from spring hangers at a 45-deg. angle, approximately 7 ft. above the footboards, and spaced about 9 ft. apart.

Electrical Contracting, August 1938

Questions ON THE Code

Answered by
F. N. M. SQUIRES

Chief Inspector New York Board of Fire Underwriters

An Inspector Questions

Q. "In your answer to question #4 in February, overcurrent protection at 140 percent maximum is required for installation of Underwriters' Laboratories approved oil burners. We understand that 4322c-3 excepts this class of equipment from application of the rule, as the Laboratories do not approve oil burners that are not arranged with the safety combustion controls mentioned in this section. Your comment is invited, since if we are not right a correction of our interpretation is in order."—A.B.C.

A. Underwriters' Laboratories have not as yet listed any oil burners as meeting the classification of 4322c-3. Up to the present but one oil burner manufacturer has requested Underwriters' Laboratories to test their outfit to ascertain whether or not the safety combustion controls operate to protect the motor against overcurrents.

As yet even that manufacturer has not asked the Laboratories for a listing under that test, but requested the test merely in order that the Laboratories could notify the New York Board of Fire Underwriters that their burner did meet that condition. Therefore, that inspection department does not accept any oil burner unless the motor is provided with an approved inherent overheating device or overcurrent protection at not over 140 percent of the motor name plate rating.

New Anaesthetic Gas

Q. "In some of the Hospitals in this city they are using a new gas in the operating rooms. The name of this gas is Cyclopropane Liquidified Hydro Carbon Gas for anesthesia and I have been advised it is highly explosive. Do you know anything about this gas or

what the flashing point is? If it is as dangerous as I have been told it is, I am going to insist that they immediately equip the operating rooms with explosion resisting devices and fixtures. If you can give me any advice on this type of gas, I certainly will appreciate it."—J.P.R.

A. Cyclopropane is an anaesthetic gas and is also called trimethylene and isomer of propylene. The chemical formula is $(CH_2)_3$. Its boiling point is minus 29.8F and the ignition temperature is 930F. Its explosive limits, % in air, is from 2.4 to 10.3. In oxygen 2.45 to 2.63. In nitrous oxide between 3.0 and 28.0. The fire hazard of cyclopropane is similar to that of propane, which is in a class with ether.

This gas is usually administered in proportions of about 15 per cent of cyclopropane to 85 per cent oxygen, which proportions are definitely flammable. The 15 per cent concentration in oxygen is near the proportion which produces a maximum explosive effect. You would be perfectly right, therefore, in requiring that operating and anaesthetic rooms where this gas is used, be equipped with explosive proof devices and fixtures.

Watts Per Square Foot?

Q. "In Nov. 1937, in rules for residence branch circuits you state 2 watts per square foot is to be figured for lighting load in residence branch circuits. This taken from Section 2107 in the Code. But this does not appear in Section 2107. And it is incorrect as far as the standard load watts per square foot mentioned in Table 1, Section 2202. For single family dwellings, it is one watt per square foot with 100 per cent demand factor up to 2,000 square ft. Please advise which is correct."—R.C.H.

Q. "In the 1937 Code (Par. 2107) the load is said to be figured at not less than 2 watts per sq.ft. of floor area with other additions. However, in the table on page 281 under watts per sq.ft. next to single family residences, 1 watt per sq.ft. is used. Which is correct?"

Also in example No. 1, Page 294, 2 watts per sq.ft. is used to figure load on branch circuits, while in Example No. 3, 1 watt per sq.ft. is used. Please explain the reason for the different values used in these two cases."—J.B.C.

A. These two questions just received from two widely separated sources show that there is still confusion regarding two computations to be made in applying the 1937 Code. These two computations are for different purposes and different factors are used in each computation. Probably some of the confusion is caused by the caption of Section 2107, which is "Calculation of Load" and by the use of the word "load" throughout 2107. It might have been less confusing had Section 2108 "Determination of Circuits" preceded Section 2107.

It must be remembered that Sections 2108 and 2107, are used only for the purpose of determining the number of branch circuits which must be installed in the premises under consideration. And the factor for the determination of the number of circuits is 2 watts per square foot (except in the "other occupancies" as under 2107b) plus certain other additional load for appliances. But let us assume that we have found out how many circuits must be used and let's forget that part for the time being.

Now we must compute the ampere capacity of the feeder requirement. For this feeder size computation, we use Sections 2202 and 2203. And Section 2202a refers us to Table 17 of Chapter 9 for our wattage per square foot. And in Table 17 we find that the factor for lighting loads in dwellings is 1 watt per square foot. To this is to be added additional load for appliances as specified in 2202b and c.

Now to straighten out the confusion over the examples pertaining to these two computation, note the fine print note in parenthesis under "Example No. 1. Branch Circuits" and "Example No. 3 Calculations of Feeders" on page 294. This clearly shows that Example No. 1 and also Example No. 2 refers to Section 2107a, used in determining the number of branch circuits to be provided. Example No. 3 refers to Section 2202 and is used in determining the size of feeder. Example No. 4 also refers to Section 2202 and shows the calculations for feeder size.



PYE ELECTED TO HEAD INSPECTORS

The Executive Council of the International Association of Electrical Inspectors recently chose for president Harvey N. Pye of Atlanta, chief engineer of the South-Eastern Underwriters' Assn. Mr. Pye succeeds L. W. Going of Portland as international president. Other officers are:



HEADS INSPECTORS—Harvey N. Pye recently elected president of IAEL.

first vice-president, F. N. M. Squires, New York City; second vice-president, K. W. Adkins, St. Louis; third vice-president, C. E. Hardy, Oakland; fourth vice-president, H. A. Patton, Seattle; and secretary-treasurer, Victor H. Tousley, Chicago.

Prior to his presidency, Mr. Pye had been closely identified with inspector activities, having served on the advisory committee, executive council, association financing, and as chairman of the sections and chapters committee.

ELECTRICAL COMMITTEE GETS EEI CODE PROPOSAL

Chairman A. R. Small recently submitted to members and alternates of the Electrical Committee, N.E.P.A., the Edison Electric Institute's detailed list of proposed changes in the National Electrical Code. Consideration of these changes is

expected to be given at a meeting scheduled for December 1939. These essential proposals are made:

1. Provision for the general use of non-metallic sheathed cable of the covered neutral type, as a wiring system.
2. Provision for the use of duplex and multiple-conductor cables of covered neutral type in raceways of all classes.
3. Provision for bare neutral in conduit and electrical metallic tubing for general use.
4. Provision for the general use of thin-wall insulation.
5. Modification of the conduit area rule to permit in old installations utilization of the waste space for additional wire required by increased loads.
6. Recognition of service cable of the covered neutral type for general indoor use.
7. Removal of requirement for mandatory use of rigid conduit in theaters, elevators and hazardous locations and of metal-clad wiring in garages.
8. Deletion of rule requiring conduit to be shipped in 10-ft. lengths.

The Electrical Committee Bulletin is being circulated to all members, and the various items are being referred directly to the appropriate Article Sub-Committees. The Electric Light and Power group has presented a carefully detailed list of suggested editorial changes and deletions for various sections of the 1937 Code. Article Committees are expected to report their recommendations with respect to these proposed changes in advance of the 1939 meeting of the Electrical Committee.

TWELVE A/W CITIES LICENSED

Twelve important centers have now been licensed to operate the certification phase of the National Adequate Wiring Program. Cities recently added to the list are:

Alexandria, Va., through the Electric League of Northern Virginia; Cincinnati, Ohio, through the Cincinnati Electrical Association; Omaha, Nebraska, through the Omaha Electrical League; and Salt Lake City, through the Electrical League of Utah.

Cities now licensed—in addition to those just enumerated—are New York, Philadelphia, Washington, Charlotte, N. C., Birmingham, Memphis, Tri-Cities and Los Angeles. In almost every instance the local group will certify homes wired to the approved local standard in an area larger than the city limits. Applications for a license have been received from four more cities.

To provide working material for local committees, the folder "Wiring With Help of F.H.A." has been added to the list of promotional materials available through the National Adequate Wiring Program.

TO TRAIN YOUNGSTERS

An apprenticeship program has been set up in San Francisco through the cooperation of the San Francisco Electrical Contractors' Association, Inc., Local No. 6 of the I.B.E.W., and the public schools. Classes are held two nights a week at an evening high school. F. O. Sievers was chairman of the Contractors' Association committee.

CHICAGO INSTITUTE STRESSES HOME LIGHTING

The success of Chicago home service girls in spreading the gospel of correct residential lighting has prompted a two-day Residential Lighting Forum to be held August 25 and 26 under the auspices of the Chicago Lighting Institute. Because of an unusually interesting program, attendance is expected of not only the home service departments, but utility executives, electrical contractors, wholesalers and manufacturers from the Chicago area.

The objective of these sessions is to have the home service girls, and others, adequately informed on subjects tributary to better lighting. The subject of wiring will receive special emphasis, and

HEPLERS SPARED—Surviving the recent Olympian train wreck in Montana were Mr. and Mrs. S. G. Hepler of Seattle. Speeding homeward from the NECA Executive Committee session in Chicago, they were wrecked at 12:30 midnight, and 40 lives were reported lost. Mr. Hepler is standing with his back toward the camera, waiting for help at 9:00 A.M. Latest reports indicate an early recovery for Mrs. Hepler, while Mr. Hepler suffered only minor bruises.



A non-tamperable fuse
that is

practical

for the user

and

profitable

for You!

PRACTICAL for the user

because it stops needless blowing — and thus wipes out any excuse for tampering. The long time-lag of the fustat prevents it from blowing when motors start on washing machines, refrigerators and other such appliances. Yet it . . .

Protects flexible cords against burnout — in spite of long time-lag

The fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts or grounded sockets is well known. The fustat . . .

HOLDS like a large fuse when safety permits —
OPENS like a small fuse when safety demands.

Prevents circuits being robbed of protection

The fustat protects the user against anyone unwittingly creating a fire or injury hazard thru haphazard practices.

Unlike ordinary fuses a fustat cannot be replaced with a penny — or with a size too large to protect. In fact, side-tracking the fustat in any way is practically impossible without destroying the fustat or adapter and thereby showing the user that his protection is gone.



Retails at 7½¢

Fits present fuseholders

Thru the use of an inexpensive adapter, that locks in place, the fustat fits in any standard Edison base fuseholder.

On new jobs you can specify that panels, switches etc. be equipped with fustat bases.

It's just good business to sell, install and use Fustats



Retails at
7½¢
in 15 to 30 amp. sizes



PROFITABLE for you

because it permits adding more appliances to present circuits. The circuit can be loaded right to capacity with perfect safety — and without needless blows even when motors are started. This often saves the expense of a new circuit and helps close a sale.

Stops dangerous overloading of circuits

Since it is practically impossible to replace the fustat with anything but another size of the correct size — circuits cannot be loaded beyond safe capacity. If additional circuits are needed the user cannot readily side-step the issue by overloading the circuit at the sacrifice of safety.

Reduces loss of time and money on needless "blown-fuse" service calls

When a fuse blows on a starting current everybody loses. The user's service is off . . . the service man may be dragged away from more profitable work . . . the full cost of the call may not be collected if the user kicks about paying it just to have a fuse changed . . . the whole electrical industry loses because needless interruptions of service are costly, annoying and unnecessary. The fustat stops this senseless waste by eliminating such "false-alarm" service calls.

The FUSTAT

FOR FULL INFORMATION WRITE TO ANY OF THESE FIRMS

BUSSMANN MFG. CO. University at Jefferson, St. Louis, Mo.	JEFFERSON ELEC. CO. Bellwood, Ill.	KIRKMAN ENG. CORP. 121 Sixth Ave., New York City	NATIONAL ELEC. PDTS. CORP. Fulton Bldg., Pittsburgh, Pa.	UNION INSULATING CO. 277 Broadway, New York City
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Electrical Contracting, August 1938

the relation of adequacy in the wiring installation to assure full comfort and convenience will be featured. The National Electrical Code and the relationship of local electrical code requirements will also be discussed. Speakers of national prominence will handle a wide range of related subjects.

SAN FRANCISCO MERGER

A recent merger of the Master Electrician's Club now gives the San Francisco Electrical Contractors Assn. Inc., its largest membership in 30 years. A joint meeting was held on July 7th, when 49 members of the Master group merged with 58 members of the senior organization. R. H. Thompson, president of the Master Electricians Club, James Surtees, its secretary, and George W. Abbott who headed the coordination committee, were temporarily made ex-officio members of the board of directors. The Master Electricians Club, composed of residential contractors, will maintain its identity as a group to deal with its own particular problems. A bid depository, recently established by action of both associations, was responsible for negotiations leading to the merger.

WILLIAMSON A WESTINGHOUSE VICE-PRESIDENT

The election of Walter Williamson as vice-president of the Westinghouse Electric Supply Co. has been announced. Mr. Williamson will supervise the development of the apparatus and supply business, both as



Supply Executive—Walter Williamson,
Westinghouse vice-president.

to operations through the company's seventy-two branch houses in the field and its relationships with suppliers.

Since 1910, Mr. Williamson has been actively engaged in the electric supply business. He was general manager of the eastern district of the Westinghouse Electric Supply Co. until June, 1930, when he was transferred to headquarters as manager of supply sales.

INDIANA-ILLINOIS INSPECTORS MEET

The Indiana and Illinois chapters of the Western Section, International Association of Electrical Inspectors met jointly in Gary, Indiana on June 9-10. Attendance exceeded 200.

A. J. McGivern of the Chicago Electrical Wholesalers Association spoke in opposition to trends toward cheap wiring. Richard E. Vernor of Chicago, discussed the problem of preventing fires before they start. The history and development of

neon tubes was outlined by John T. Moore of the Chicago Electrical Inspection Department, and the developments and uses of fractional horsepower motors and their effect upon wiring systems by T. Van Abbema, Chicago.

Other speakers included—E. E. Forrest of Gary, Indiana on change-over work from 25 cycles to 60 cycles. Victor H. Tousley of Chicago led a discussion on changes in the 1937 Code. Indiana state-wide farm inspection was explained by J. J. Scherer of Indianapolis, chief inspector of the Indiana State Fire Marshall's office. A. C. Tait of New York told the story of the National Adequate Wiring program.

A resolution vigorously opposing bare neutral wiring, modification of the conduit capacity rules and other changes in the Code was accepted by a unanimous vote of the meeting.

BEN CLARK RETIRE

Retiring Chief Inspector Ben Clark of the Detroit Electrical Inspection Bureau finished 33 years as head of that department on July 31. He started his career with the General Electric Company at West Lynn in 1888, going from there to the Detroit Edison Company. In 1903 he became an electrical inspector and was appointed chief in 1905.

Many rules born in Ben Clark's office



Veteran Inspector—Chief Clark of
Detroit who retired July 31.

have been carried into the Code. The loop system, requiring all joints at outlet boxes, non-metallic sheath cable for residential work, the elimination of lamp base plug receptacles and wood moulding are among the electrical developments which started under his guidance.

Mr. Clark is an active member of the Western Section IAEI, and a charter member of the Electrical Council of the Underwriters Laboratories. He will continue his interest in things electrical as a consulting engineer.

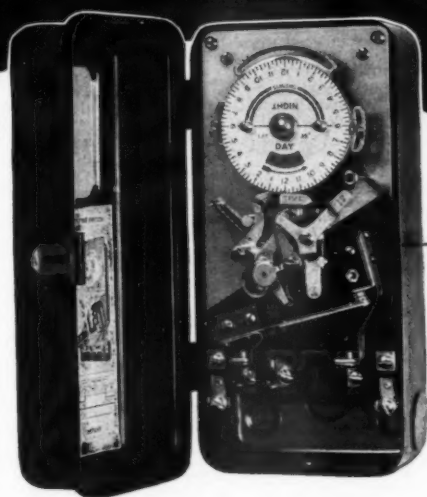
N.C. COLLEGE BEGINS PRACTICAL COURSE

The North Carolina State College of Agriculture and Engineering, in cooperation with the North Carolina Board of



"Let's wire th' floor above first, Pete."

THE UNSEEN HAND



New ASTRONOMIC DIAL TIME-SWITCH

Store owners want the latest and most convenient window lighting control! Offer the new, popular priced, Sangamo KZ Astronomic Dial Time-Switch!

THAT MAKES THIS TYPE OF INSTALLATION *Completely Automatic*

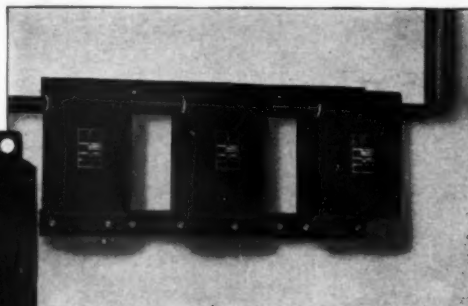
When store owners join together in keeping all the show windows in their block brightly illuminated during certain evening hours, they are sure to get the attention (and \$\$) of the shopping public. Any aggressively-minded electrical contractor can add prestige (and \$\$) for himself by selling Sangamo Time-Switches for putting over this idea.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD ILLINOIS

LOWER LIGHTING COSTS LOWER INSTALLATION COSTS



This is the indoor wall mounting type. Note the large, roomy outlet box and the convenient, plainly marked terminal board.



Because mercury vapor illumination is almost twice as efficient as incandescent lighting, substantial savings can be effected through its use. The economy in power consumption and the advantage of better lighting will more than pay for the new equipment.

Because convenient terminal boards and spacious outlet box compartments reduce installation costs, SOLA Mercury Vapor Lamp Transformers are preferred by contractors everywhere.

SUSPENSION TYPE an integral part of the lighting fixture

Beautiful to look at—and just as practical and efficient in operation—is this famous SOLA suspension type transformer. Built to appear as part of the fixture, it eliminates "eye-sores" and needless waste of space and wiring usually taken by ordinary transformer units. Roomy outlet box, smart, black crackle finish. A big favorite throughout the country.

FIND OUT how hundreds of great industrial plants the country over have increased efficiency and lowered operating costs with Mercury Vapor lamp lighting and SOLA transformer units. Write today for complete details and SOLA Transformer Specifications. No obligation.

**Your Electrical Jobber Can
Serve Your Requirements**

LISTED BY UNDERWRITERS

SOLA ELECTRIC COMPANY, 2525 Clybourn Ave., Chicago, Illinois

SOLA

MERCURY VAPOR LAMP TRANSFORMERS



In the News

[FROM PAGE 44]

Examiners of Electrical Contractors and North Carolina Association of Electrical Contractors, is offering a short course for electrical contractors, inspectors, electricians and others interested in electrical installations and practices. The short course was planned as a part of a program of elevating the standards and practices of electrical installations in the State. However, it is open to anyone interested in the subject.

Professor Leroy M. Keever, of the Department of Electrical Engineering and Vice-Chairman of the Board of Examiners of Electrical Contractors, will be in charge of the program. Present plans are to make this short course an annual affair. A registration fee of \$5.00 includes lodging and meals for two nights.

COMING MEETINGS

American Institute of Electrical Engineers—Portland, Oregon, August 9 to 12.

Florida Association of Electrical Contractors and Dealers—Fall Meeting, Key West, Fla., Aug. 22-23.

Illuminating Engineering Society—Annual convention, Hotel Nicollet, Minneapolis, Minn., Aug. 29-Sept. 1 incl.

International Association of Electrical Inspectors—Eastern Section, Baltimore, Md., Sept. 6-8; Southern Section, Jacksonville, Fla., Sept. 12-14; Western Section, Cleveland, Ohio, Sept. 19-20; Northwestern Section, Hotel Davenport, Spokane, Wash., Oct. 3-6; Southwestern Section, Long Beach, Calif., Oct. 10-12.

National Electrical Contractors Association—Annual convention, Book-Cadillac Hotel, Detroit, Mich., Sept. 12-15.

International Municipal Signal Association—Lord Baltimore Hotel, Baltimore, Md., Sept. 12-15.

Ohio Electrical Contractors Association—Annual Meeting, Cincinnati, Ohio, Oct. 18-20.

National Electrical Wholesalers Association—Semi-annual Convention, Drake Hotel, Chicago, Oct. 18-21.

National Electrical Manufacturers Association—Annual conference, Palmer House, Chicago, Ill., Oct. 24-28.

LEAGUE SPONSORS

HOME SURVEYS

Customers, who receive power company emergency service in the vicinity of Washington, D. C., are offered a free survey of their wiring to locate and prevent future system troubles. This service, sponsored by The Electric Institute, is expected to aid its contractor members obtain more home re-wiring business.

The wiring survey program covers these points—

1. Trouble men of the power company give customers a printed folder supplied by the Institute.

2. Folders explain the need for checking the wiring system to avoid future trouble and outages.

3. A return postal card may be sent by the customer to the Institute, requesting a free wiring survey.

Electrical Contracting, August 1938

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO

WIRE • BARE WIRE • MAGNET WIRE • SERVICE ENTRANCE CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE

AGAIN

IN THE NATION'S CAPITAL



Elec. Contr. H. P. Foley Co.,
Washington, D. C.

USED THROUGHOUT

IN THE

BUREAU

OF

ENGRAVING AND PRINTING

Treasury Department . . . Washington, D. C.

The great amount of machinery and precision equipment in this magnificent building (one of the largest ever erected by the U. S. Government) taxes wires and cables to the utmost. To insure maximum dependability, CRESCENT ENDURITE INSULATED WIRE AND CABLE, designed to meet excessive temperature and aging conditions, and CRESCENT VARNISHED CAMBRIC POWER CABLE, to feed the presses, were given the job of carrying this essential load. If you have similar conditions to meet and want to be sure of uninterrupted operation, put the job up to CRESCENT.

CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER PROOF WIRE

Electrical Contracting, August 1938

47

WIRE • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE



**REMOVE ONE CAP—
REPLACE THE LINK
—THAT'S ALL WITH
SHAWMUT
SHUR-LAG
RENEWABLE
FUSES**

ASK ABOUT THEM

The **CHASE-SHAWMUT
COMPANY**



**NEWBURYPORT
MASSACHUSETTS**

In the News

[FROM PAGE 46]

4. The Institute makes the wiring survey, submits its wiring recommendations to the customer, and supplies a list of contractor members qualified to do the work or quote on it.

This is a new activity in the Washington area. It will take several months to determine how many users of electricity avail themselves of a free check-up of wiring, after system troubles have occurred. A recent check up showed 380 trouble calls in ten business days, so there will be many prospects for this service.

CHARLES HONOLD DIES

Charles A. Honold, head of the Chas. A. Honold Co., Sheboygan, Wis., died July 5 at his place of business. In 1898, Mr. Honold, with his brothers, Henry and William, purchased the Sheboygan Plumbing Co. and reestablished the business under the name of Honold Brothers. In 1914 the Honold Electric Co. was incorporated.

PATRICK JOY DIES

Patrick Joy, veteran electrical contractor, died suddenly at his home in Oshkosh, Wis., July 11 of a heart ailment. He was 65. A native of County Kerry, Ireland, Mr. Joy came to Oshkosh at the age of 16 and had been engaged in the electrical contracting business for the past 20 years.

MILWAUKEE CONTRACTOR DIES

Peter R. Stenz, secretary-treasurer of the Stenz Electrical Co., Inc., Milwaukee, was found dead July 2 in the basement of the company's quarters. Mr. Stenz had been in ill health. He was 43.

BOOK REVIEWS

Illumination Theory and Practice

A completely revised 258-page book, "Artificial Light and Its Application" records for the new engineer and established lighting specialist, the advances in the art and science of illumination. The purpose of this book is to furnish a permanent record of the facts, data, and examples necessary as a background for illuminating engineering. Includes new material covering scientific advances which have occurred in the past two years. Tables have been amplified and revised, chapters have been added and the text has been simplified.

There are now nineteen chapters covering—light sources; the language of lighting; photometry; light and vision; color; light control and lighting equipment; interior lighting design; industrial, school, commercial and public building lighting, display, home and farm lighting, flood-lighting, recreational, sports and architectural lighting. Chapters also cover electrical advertising, street and highway lighting and light in the theatre.

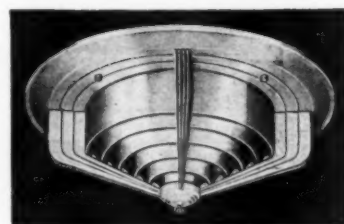
Printed in 8 1/2 by 11-in. size, with durable paper cover, this reference book may be obtained for 75 cents from any district or branch office of the Westinghouse Lamp Division, Westinghouse Electric & Manufacturing Co.

**How Many
Stores
in Your Block
need**

Sterling



**LITE-FLO REFLECTORS
and
STER-LITE FIXTURES**



Why not find out? Just walk down the street this evening and observe the stores with obsolete show window or interior lighting.

Whether it is a new store, a remodeled store, or a poorly lighted store, Sterling Lite-Flo Reflectors and Ster-Lite Louver-Controlled Direct Lighting Units give you PLUS LIGHTING VALUE that wins wiring contracts.



Write for the
**NEW
Sterling
CATALOG**

**STERLING REFLECTOR CO.
1435 W Hubbard St CHICAGO**

Electrical Contracting, August 1938



"If I were an ADVERTISING MANAGER"



That's just one of the talks to be delivered anonymously by a masked speaker that will set every man thinking at the Annual Conference of National Industrial Advertisers Association in Cleveland, September 21-23. A second masked speaker will tell what he would do if he were a publication representative.

We're not going to tell you much here—just highlight the program enough to make your mouth water and your brain tingle.

T. M. Girdler, Chairman, Republic Steel Corporation, is scheduled for the opening address and when "T. M." talks he says something.

J. H. McGraw, Jr. will talk on "What I Would Do Now If I Were An Industrial Advertising Manager."

The new Publisher's Statement will receive full discussion.

Clinic sessions, so popular last year, will again cover a wide range of interesting subjects. Two half-day sessions instead of one.

A general conference session will cover such subjects as "Preparing the Plan", "How to Gather Usable Material", "Copy Technique", "How to Sell Management", "Co-ordinating

Sales and Advertising" and "How and Why to Use an Industrial Agency."

Another session will deal with "Problems of the Small Advertiser", "Production Problems", "Public Relations"—and there are many others.

If I were an Advertising Manager, I certainly would start now to make plans to attend the 16th N. I. A. A. Conference even if I had to hitch-hike to Cleveland. And I would send in my advance registration now to—Ed. Bossart, Bailey Meter Company, Ivanhoe Road, Cleveland, Ohio.

IF I EMPLOYED AN ADVERTISING MANAGER—I would make certain that he at-

tended this Conference, because changing times and markets demand a changed viewpoint—a new viewpoint that can be obtained only by hearing discussions by men whose experience is up-to-the-minute—right up to September 21st.



NATIONAL INDUSTRIAL ADVERTISERS ASSOCIATION

100 EAST OHIO STREET

CHICAGO, ILLINOIS

QUALITY means ECONOMY

- EASIER BENDING
- EASIER CUTTING
- EASIER THREADING
- EASIER WIRE PULLING



"ELECTRICTUBE"

Electrical Metallic Tubing is coated on the outside with a substantial amount of zinc evenly deposited by electro-plating process to stand severe corrosive conditions. Interior surface is coated with an enamel especially developed by us, which is impervious to acid and insures a perfect roadway for pulling wires. Can be used with any standard light wall fittings.



"GALVAKOTE"

Exterior surface and threads coated with zinc evenly deposited by electro-plating process in quantity to withstand more than four dips of France test in regulation copper sulphate solution. Interior furnished coated with the best quality black enamel.



"ENAMELKOTE"

Coated inside and outside with high-grade black enamel, properly baked in modern ovens to insure adhesion to pipe wall, and sufficient flexibility to prevent flaking in bending.



"HOTKOTE"

Exterior and interior surfaces evenly coated by the hot galvanize process and then covered inside and outside with a coat of transparent enamel.



"HOTKOTE" NIPPLES

These rigid conduit nipples are also approved by the Underwriters' Laboratories and so labeled. All threads are protected with a special coating that is rust resisting.

Underwriters' Laboratories tested and approved.

Distributed everywhere by leading wholesalers.

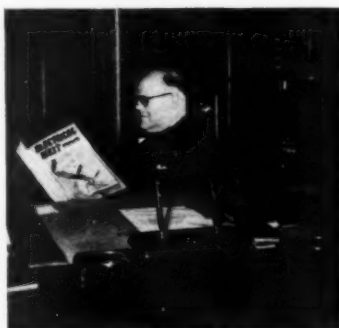
CLAYTON MARK & COMPANY

20 N. Wacker Drive, Chicago U. S. A.

MANUFACTURERS FOR MORE THAN A THIRD OF A CENTURY.

Shop Names

What's in a name— Take the Central Armature Works, Inc. of Washington, D. C., for example. This large organization is quartered in its own three-story concrete building, located within a short distance of the Capitol, at the center of Washington. Henry Doerr tells us the firm name stands for what it implies. No matter where the customer is located, Central service is readily available. It seems to keep things busy in the shop too, both with construction work and industrial supplies.



CONTRACTOR-POLITICIAN — An important figure in San Francisco political and business life is Cornelius F. Collonan, owner of the Collonan Electric & Manufacturing Co. Recently moved into a new store on Mission Street, his second floor private office is the acme of electrical equipment and facilities. Besides having a very attractive merchandise store, he has an exceptionally well organized construction shop. From here he does a steady business among old San Francisco firms, residences and new stores, along this secondary business artery, Mission Street.

Parts Inventory

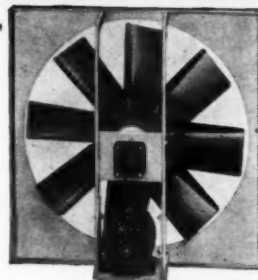
Checking up on his small motor parts business, E. H. Kotz of the Electrical Motor Repair Co., Trenton, N. J., found that his stock contained 120 different types of centrifugal starting switches for single-phase motors. Eddie says Trentonites want quick service, so he keeps prepared for emergencies.

Bid Quandary

It isn't just the job with many bids that produces wide price variations, explains W. R. Govett of W. V. Pangborne & Co., Inc., Philadelphia. Bids for two local school jobs were recently opened, and a \$180,000 job went for \$139,000. Only three firms submitted bids. Another job worth \$135,000 had 8 bidders and was let for \$124,000.

Insist on
CERTIFIED RATINGS
Install
AUTOVENT
Ventilation

"The Complete Line"



The New COOLVENT System of VENTILATION

is the most economical way to obtain the advantages presented by an expensive refrigeration system! Far superior to make-shift fans that merely create an artificial breeze. It not only exhausts hot stagnant air but also draws cool, refreshing air through the premises, causing an unbelievably comfortable condition! The unit itself is installed in attic or upper section of home or building. It operates quietly due to double pillow block bearing supports. Objectionable vibrations are never a factor! Certified ratings per National Association of Fan Manufacturers tests! Keep comfortable in sweltering summer weather! Write for amazing COOLVENT bulletin No. 204 A quick!

AUTOVENT FAN & BLOWER CO.
1815-21 N. KOSTNER AVE. CHICAGO, ILL.



No Costly Castings or Forgings

ILSCO construction does not require the use of castings or forgings. That's one reason ILSCO Solderless Connectors are so economical to buy . . . their utter simplicity makes them equally economical to use. Other ILSCO features:

- NO Set-screw contact
- NO flattening or separating of stranded wires.
- NO limitation to one size wire.
- NO special tools required
- NO shearing effect whatsoever.



NO need for you to search any longer for the PERFECT Solderless Connector . . . WE HAVE IT! Six Sizes Take Care of All Wires from No. 14 to 1,000,000 C.M.

FREE—A large display board bearing mounted samples of ILSCO lugs. Address Dept. EC

ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road, Cincinnati, Ohio

COOL AS A
DOG'S NOSE
BOSS. IT'S THAT
ONE-PIECE
COPPER THAT
DOES IT

YOU SAID IT JOE.
NOTHING BUT
WESTINGHOUSE FOR
ME FROM NOW ON
AND THEY'VE SURE
LICKED BEADED
CONTACTS WITH
THOSE DIAMOND
POINTED JAWS,
TOO



SIMPLICITY IN SAFETY SWITCH DESIGN MEANS LESS HEATING

One-piece copper parts in Westinghouse Safety Switches assure cool operation at all times — there can be no heating from loose connections.

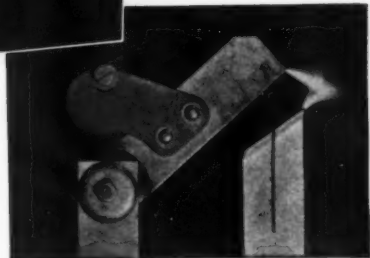
And years of trouble-free service are assured by these added Westinghouse features: Diamond pointed jaws and extended blades confine beading

to points outside the contact areas... the "De-ion" feature on all Westinghouse 575 and 600-volt switches quenches destructive arcs almost instantly.

Reduce your service worries —standardize on Westinghouse Safety Switches. All commercial types and ratings available from your electrical wholesaler.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., EAST PITTSBURGH, PA.

The exclusive Westinghouse diamond pointed jaw confines the bead to sections outside the contact area, sections which do not normally carry current.



J-20518-A



Westinghouse Safety Switches

MOTORS • CONTROL • CIRCUIT BREAKERS • SAFETY SWITCHES • PUSH BUTTONS

SUDDEN DEPTH DRILL SENSATION OF THE CENTURY Drills Holes LIKE MAGIC



This phenomenal electric rotary drill will make your holes twice as fast and at half the cost per hole that you have been accustomed to. Every hole clean, exact and free from chipped or splintered edges. High heats do not affect the drilling qualities of SUDDEN DEPTH—and you can lean hard on it to do a fast, workmanlike job. It is quiet . . . permitting work anywhere during regular working hours without disturbing the other workers. Insist upon SUDDEN DEPTH, the electric rotary and press drill point generously tipped with Carboloy—non-brittle and the hardest metal known to man.

AND THEN — a secure lasting anchorage

P Startling things have happened to lead expansion anchor design. Paine anchors now use the new **B.N. TYPE** Paine Mix Lead **LEAD ANCHORS** Alloy, immensely stronger, extremely flexible, simplified in design and easier to use . . . all at no increase in price.

for Hollow Places

A Demand Paine Toggle Bolts, because they're best for use with any hollow backed material. Their action is instantaneous in any position; and they may be had in any size, with any style of nut and bolt or machine screw.



THE PAINE COMPANY
Dept. 588 — 2947 Carroll Avenue,
CHICAGO

East. Office—79 Barclay Street, NEW YORK
Offices in many other large cities

It Can Be Done

In five years the Betts Electric at Pen-ticton, B. C. has built up one of the largest contracting businesses in interior British Columbia. Mr. Betts started with one electrician but now has ten on his contracting staff alone, and has just opened showrooms twice the size of those vacated. During the past few years the contracting department has completed all the theatre electrical installations in the Okanagan Valley, where a number of new theatres have been erected and others remodelled.



WORCESTER MOTORMEN—Small motor service gets just as much attention from A. L. Brown Associates, Inc. in Worcester, Mass., as the big fellows. A. L. Brown and Fred M. Shaw watched the trend toward smaller units such as motorized tools, and installed additional shop facilities to cut costs on small motor work. They made it pay. Mr. Brown is treasurer of the National Industrial Service Association.

Sportsman Service

Morris Hunter, well known Richmond Va. electrical contractor, helped a perplexed quail-breeder friend work out an automatic electric brooder several years ago. Now Mr. Hunter holds patents on a device, does a sideline business on it with state game commissions, quail breeders and leading sporting organizations all over the country. And Morris has become one of Richmond's authorities on raising quail and pheasants.

Automatic Daylight

When the Electric Motor Repair Co. recently modernized the lighting for a large Baltimore publishing plant, John P. Wheeler provided photo-electric cell controls for each department. Now rows of new blended mercury vapor and incandescent illumination automatically provide a daylight effect. Whenever an area becomes darkened by a cloudy sky or toward evening, these controls do their work.

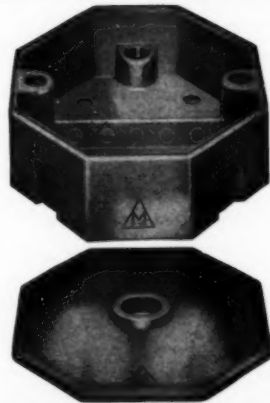
WRITE!

For
INFORMATION ON

- ☐ TIME SWITCHES
- ☐ PROCESS TIMERS
- ☐ INTERVAL TIMERS
- ☐ DEFROSTING SWITCH
- ☐ PROGRAM TIME SWITCH
- ☐ LINOTYPE TIME SWITCH
- ☐ DELAYED ACTION SWITCH
- ☐ FLASHERS — ALL TYPES
- ☐ PHOTO ENGRAVING TIMER
- ☐ HEATING PLANT CONTROL
- ☐ MOTOR REVERSING SWITCH
- ☐ FIRE DRILL SIGNAL SWITCH

Automatic Electric Mfg. Co.
Mankato, Minn.

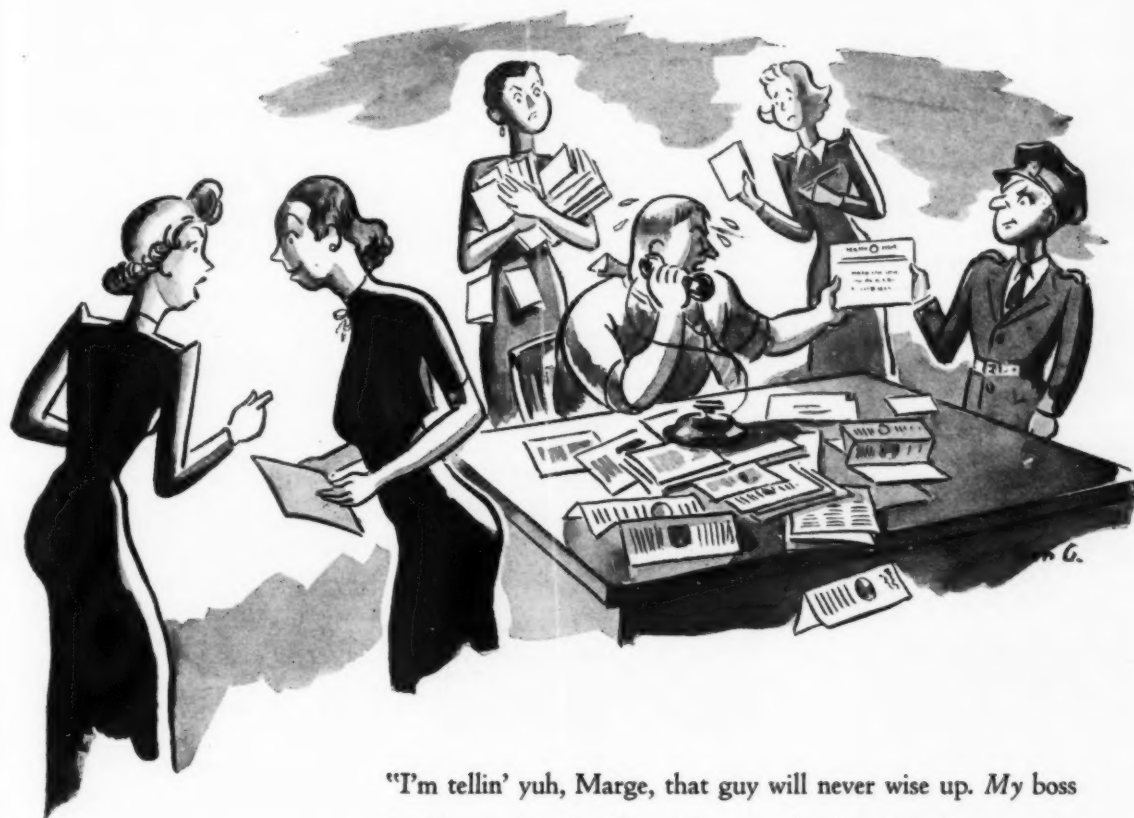
Profit by USING ILLINOIS Dependable Porcelain OUTLET BOXES



*Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency. Contractors who use these products not only establish themselves most securely with their customers but also build their business by making each job a true quality one. Send for bulletin.

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILL.

"He's looking up some electrical gadget
—*the hard way*"

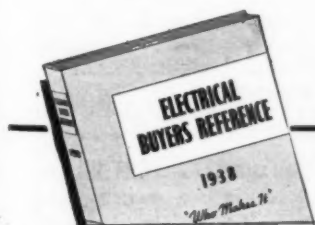


"I'm tellin' yuh, Marge, that guy will never wise up. My boss just keeps that big blue an' orange book at his elbow — the Electrical Buyers Reference. An' boy, does *he* know all the answers!"

Are you getting the most out of *your* copy of the Electrical Buyers Reference? When you need the name and address of a manufacturer, the B.R. will give it to you in one minute. And it's cross-indexed by trade names so you *can't* go wrong.

Use your copy regularly. It will save you time and money!

The Looking-Up-Place for
Everything Electrical



ELECTRICAL BUYERS REFERENCE

ELECTRICAL CONTRACTING EDITION

A McGraw-Hill Publication

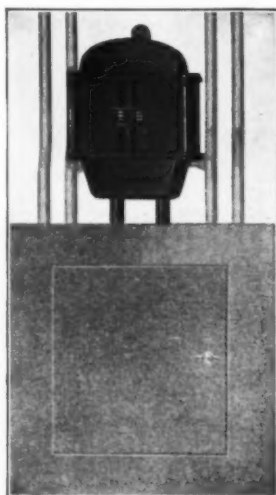
• 330 West 42nd Street, New York

SORGEL AIR-COOLED Transformers

Provide

**Lower Lighting Cost
Greater Efficiency
Increased Output
Lower Installation Cost**

Keep busy installing SORGEL Air-Cooled Transformers in industrial and commercial institutions, changing 550, 440, or 220-volt A.C. power circuits to 110 volts, because it is more economical, more practical, and more efficient for lighting, portable tools, heating devices, appliances.



Being Air-Cooled, SORGEL Air-Cooled Transformers can be installed easily and economically in any convenient place inside of buildings, or right where the change of voltage is wanted.

No long runs of wiring. No enclosures or fire-proof vaults needed. No oil. No upkeep. Approved by Underwriters.

Stock sizes 1/4 to 50 Kv-a.

Larger sizes and special types built to order quickly

Write for literature with diagrams and prices

SORGEL ELECTRIC CO.
No. Plankinton Avenue Milwaukee, Wis.

Complaint Data

Having handled factory service for six well-known makes of industrial motors, Ira F. Nelson of the I. R. Nelson Co., Newark, reports that about 80 per cent of customer troubles with new motors are not the manufacturers fault. Most breakdowns result from lack of lubrication and incorrect over-current protection, when motors are placed in service.

Open Air Conditioned Quarters

February 3rd marked the formal opening of the new Miller & Erwin electrical store in Salisbury, Md. Air conditioning and the latest in modern lighting features incorporated in this new store layout were proudly announced by this contractor-dealer firm for its 3-day open house. A complete line of appliances, radio and industrial wiring equipment was on display for visitors.



WELL DONE—Roy A. Palmer of Duke Power (left) and Sam B. McGinn of McGinn Electric Co. (right), Charlotte, N.C., seem happy over the turnout which started the local Adequate Wiring Campaign rolling. Sorry we didn't identify the equally enthusiastic gentleman in the center.

Color-Coded Tools

When several local Federal Housing projects were commenced, the Electro Construction Co. of Philadelphia sent out tools sprayed a bright red. So the plumber followed suit in adopting a yellow color, and the steamfitter's tools were sprayed green. J. V. Botto says the company's warehouse keeper has a duco spray outfit set up for keeping all tools properly identified.

Man Saving

No hard pulling and tugging on small-crew jobs that are done by Morris Newmark and Brother, of Philadelphia. A \$35 investment in a 1-ton, one-man, lever-type chain hoist provides a light-weight and flexible tool for yanking out stubborn cables, for pulling in odd runs of cable in out-of-the-way places, and various heavy lifting jobs in factory work.

MINERALLAC HANGER



Conduit 3/8"—2 1/2"
Cable to 2 1/8" (with Bushings)

MINERALLAC JIFFY CLIP



Sizes from .250" O.D. Tubing
to 1 1/4" conduit.

See your Jobber

New York City Office
Theodore B. Dally
50 Church Street

MINERALLAC ELECTRIC CO.
25 N. Peoria St., CHICAGO

**YOU CAN'T GO WRONG—
if you "RELY ON RELIANCE"**



A complete line of thoroughly dependable quality time switches with innumerable exclusive features, giving you more time switch sales opportunities.

For 28 years the name of Reliance has stood for the best in the time switch field. A good line to handle because profits are not eaten up by expensive come-backs.

See your wholesaler or
write for complete descriptive literature

RELIANCE AUTOMATIC LIGHTING CO.
1937 MEAD STREET RACINE, WIS.

Shop Movies

The amateur movie hobby of E. H. Kotz, Electrical Motor Repair Co., Trenton, N. J., has been directed to recording shop practices. When an unusually interesting job is in the works, Eddie rigs up big flood-lights, grinds out some film and puts it away. Soon he expects to assemble and edit his own service shop movie show to display before customer groups.



ALLENTOWN MODERNIZER—An office building in Allentown, Pa., was recently given a taste of modern lighting values when the Wickersham Electrical Co. installed ninety-seven 500-watt commercial fixtures. H. R. Wickersham laid out a system of surface metal raceways with two fixtures per circuit. The job looked so well the manufacturer of metal raceway materials had it photographed.

Long-Range Advertising

From Paris, France comes an annual request for a calendar to Venino Bros. & Co., Inc., motor specialists of Newark, N. J. This has been going for about ten years, after a Newark industrial customer sent an extra Venino calendar to its Paris branch office.

Richmond Has Training Plan

About 20 apprentice electricians are enrolled in a cooperative training plan now operating in Richmond Va., according to Morris Hunter, electrical contractor member of the supervisory committee. As arranged with the city's educational authorities, each student receives sixteen hours practical experience in the trade during each week of this training course. Various contractors in the city have taken one or more apprentices.

Electrical Contracting, August 1938

OKed **FIVE TIMES** *Everytime!*

by {

- ☒ Underwriters' Laboratories, Inc.
- ☒ Architect
- ☒ Electrical Contractor
- ☒ Inspector
- ☒ Owner



Molded "Thread-on" Connector



Conex "Thread-on" Connector



Porcelain "Thread-on" Connector

QUALITY—every "Thread-on" Wire Connector is uniform, assures a perfect electrical and mechanical joint, not obtainable with solder and tape. The 1/4" molded composition shell prevents shorts and grounds—is unaffected by heat, cold or moisture.

DEPENDABLE—once a "Thread-on" Connector is applied, a trouble-free connection is assured. The tapered spring insert presses (does not cut) clean threads into skinned wires, either stranded or solid. Acts as a current-carrying sleeve—gives a strong pressure contact. No corrosion.

LOW COST—"Thread-on" Connectors save money on every job as they are applied quickly—convenient to use—no need for special tools, solder, tape, etc. Just skin wires and screw on the Connector as putting a nut on a bolt—that's all!

SAFER—No open flame or heat. No scorched woodwork, ceilings or walls.

FULLY APPROVED—Listed by Underwriters' Laboratories, Inc. and other leading electrical authorities everywhere!

PATENTED—as with any good product, "Thread-on" Connectors are the finest in quality, material and workmanship. Therefore, patent No. 1,700,985 is your protection in getting the genuine product.

Millions in Use!

BRYANT ELECTRIC CO.
"Bryant"

Bridgeport, Conn.

GENERAL ELECTRIC CO.
"G.E."

Bridgeport, Conn.

IDEAL COMMUTATOR DRESSER CO.
"Ideal" and "Excel"

Sycamore, Illinois

WEISS & BIELLER MDSE. CORP.
"Simplex" and "Conex"

584 Broadway
New York, N. Y.

WIREMOLD COMPANY
"Wiremold"

Hartford, Conn.



About NECA

DETROIT CONVENTION PROGRAM

Details announced for the 36th annual NECA Convention to be held in Detroit at the Book-Cadillac Hotel on September 12th-15th, indicate a program of interest and profit to every electrical contractor. Plans are being made for the entertainment of five hundred delegates and their ladies from all parts of the United States and Canada. The local Detroit Convention Committee is under the chairmanship of C. O. Reckard, president of the Detroit Chapter, assisted by C. C. Cadwallader, Chapter secretary.

There will be seven business sessions during the four days of the convention. The opening session on Monday, September 12th, will take up some of the most important activities of NECA. This includes discussion of the Voluntary Agreement Plan for Fair Competition, the Code of Fair Buying Ethics, correction of price discrimination evils and invoking the state and federal Price Maintenance Laws.

Monday afternoon will be set aside for a full presentation of the Rural Electrification Program, the supporting programs of the Wiring Division of REA, and the wiring financing plan of the Electric Home and Farm Authority. John Carmody, Administrator of REA, has been invited to address this session, and to have various phases of the program presented by members of the REA and EHFA staffs. There will be a special session on Monday evening for contractors only, where an informal discussion of the REA program can be had and opportunity for contractors to ask questions of members of the REA staff.

The Tuesday morning session will take up industrial electrification, residential re-wiring, contractor-central station teamwork and the "Dollar Value of Apprenticeship." On Tuesday afternoon the annual NECA Golf Tournament will be held. Arrangements are being made for a conducted tour through the River Rouge Ford plant for those who do not play golf.

New Developments

On Wednesday morning there will be a unique session for the presentation of new developments and undeveloped available markets which hold opportunity for profitable business for electrical contractors. There will be eight practical demonstrations of twenty minutes each covering new

applications of electricity, new products, new methods of selling and new means of interesting customers in wiring, rewiring and electrical modernization.

The Wednesday afternoon session will be devoted to sectional meetings for electrical contractors only. One section comprising contractors exclusively employing members of the I.B.E.W., will meet to discuss the program of the newly elected Labor Relations Committee. Other sectional meetings will be arranged for members desiring to discuss special problems of their particular groups.

On Wednesday evening the annual NECA banquet will be held in the ballroom of the Book-Cadillac Hotel, followed by an interesting program of entertainment.

At the final session of the Convention Thursday morning, September 15th, papers will be presented on the operation of local associations and chapters, handling of specialized work by cooperative groups of contractors, and the pricing of time and material jobs. Election of executive committeemen and transaction of other important business will conclude this session.

Entertainment

For the ladies, the program includes a trip to the famous "Greenfield Village"



STRAIN ON THE MIKE—Grand Rapids has been the hub where western Michigan's contractors, inspectors and wiremen spent seven weeks at night meetings learning all the facts about the 1937 Code. With 195 as the average attendance, speakers used the microphone to reach them all. Here we see L. R. Strain, chief inspector of Grand Rapids, giving the boys his version.

where Henry Ford has brought together and re-erected many of the most interesting landmarks connected with our American history, luncheon at the Dearborn Inn, beautiful drives through the residential districts and Belle Isle, with luncheon at the Detroit Yacht Club. A visit will be made to one of the great automobile plants, and trips to the metropolitan shopping and theatre district in which the Book-Cadillac is located.

Electrical Exposition

The Detroit Convention Committee have arranged for a notable exhibit of manufacturers' products to be shown in the exhibit rooms adjoining the convention hall. The manufacturers' reservations for space for this exposition promise this to be of unusual interest.

All Contractors Invited

Every electrical contractor is invited to attend this great national convention, whether or not he is a member of NECA. The opportunity it affords to gain new ideas for more profitable business, both through the splendid business program and through meeting fellow contractors from all parts of the country, will make these four days a worthwhile, dividend-paying investment.

NEW CHAPTERS AND MEMBERS

From June 1st to July 15th, 65 new members were approved for NECA membership, and these five new NECA Chapters were granted charters: Los Angeles, California; Pomona, California; Pasadena, California; Riverside, California; Rochester, New York.

Honors for new memberships went to Southern California with 24, Milwaukee with 11, Rochester 10 and Georgia 9. The remainder were divided between Utah, Washington, New York City, North Carolina, Indiana, Iowa and Kansas.

Field Representative J. H. Dyer has been in Georgia for the past two months, while Field Representative R. G. Gruendler is working in Southern California.

COMMITTEE CONFERS WITH REA ADMINISTRATOR

An all-day conference between the special committee of REA contractors and REA Administrator John Carmody and his staff was held in Washington on July 11th. The contractors' committee, headed by Earl Peak, president of NECA, consisted of:

Richard J. Stretch, Monroe Electric Co., Chicago, Ill.

Walter E. Mielley, Contracting & Material Co., Chicago, Ill.

E. R. Baxter, Miller Baxter Company, Indianapolis, Ind.

G. E. Hines, Ulen Contracting Corp., Lebanon, Ind.

Paul L. Gilmore, Paul L. Gilmore Company, Columbus, Ohio.

Electrical Contracting, August 1938



... and how about some **PRIVATE INTERIOR TELEPHONES ?**

INTERCOMS

Common-talking, selective-ringing systems in capacities of two to eleven stations. Beautifully designed, and durably constructed for long faithful service. Operate from dry cells or battery eliminators.

AUTO-COMS

Deluxe dial type intercom. system, providing selective talking and selective signaling service for a maximum of ten stations, permitting as many as five simultaneous conversations. Requires no automatic switchboard.



SERV-U-FONES

Inexpensive common-talking systems in capacities of two to ten stations. Conveniently packaged, attractively priced, simple to install. Dry cell operated.

P-A-X

Private Automatic Exchange systems in capacities of ten lines to a thousand—or more. Use standard automatic telephones and provide for special communication services such as Code Call, Conference, Executive Priority, etc.

You have many opportunities to “plug” private interior telephone systems and thereby cut yourself in on some extra profits.

And now is the time to push interior telephones as business has really become communication conscious, genuinely appreciates the value of intercommunication facilities and—most important—is ready to buy.

As the nature of this equipment places it in your field, you are the logical supplier. Go after this business—we’ll help you!

Automatic Electric, for over 40 years manufacturers of both public and private telephone equipment, offers private interior systems to fit any office, shop, factory or home. Shown on this page are four of the many types of systems available.

Our field representative will be pleased to supply you with literature, prices and discounts as well as to work with you on particular jobs. Call on him.

AUTOMATIC ELECTRIC

PRIVATE INTERIOR TELEPHONE SYSTEMS

Distributed by: **AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 West Van Buren Street, Chicago, Illinois**
Sales and Service Offices in Principal Cities • In Canada: Canadian Telephones & Supplies Limited, Toronto

Electrical Contracting, August 1938

Every phase of electrical maintenance and repair work covered in this *new* Library

**5 volumes
of practical
how-to-do-it
information**



Every man concerned with the care and repair of electrical machinery should have these practical books, with their helpful tables, diagrams, data, methods and kinks. Every one of the five volumes is jammed to the covers with sound, how-to-do-it information—the kind you have to have when anything goes wrong. Liberal use has been made of practical data and practice in repair shops so as to combine the good features of a library of methods with handbook information covering these methods.

Electrical Maintenance and Repair Library

5 volumes—2042 pages—1721 illustrations

IN these books will be found answers to practically all the repair and winding problems that the electrician will meet in actual practice. The books discuss direct and alternating current windings—repair shop methods for rewinding armatures—commutator connection—the testing of armature windings—the testing of induction motors for faults—practical ways of reconnecting induction motors—commutator repairs—correct brush troubles, etc.

They tell you how to inspect and repair motor starters and generators—how to diagnose motor and generator troubles—how to figure new windings for old cores on induction motors.

You learn about three-wire systems, starting rheostats, transformers and starting polyphase motors, etc.

They give you scores of practical methods used by electrical repairmen to solve special problems.

New trouble-shooting and repair book now included in Library

Now, in addition to four well-known practical books on all details of testing, connecting, rewinding, installing and maintaining electrical machinery, the Library of Electrical Maintenance and Repair includes Stafford's *Troubles of Electrical Equipment*, a new book full of helpful maintenance information special trouble-shooting charts, explanation of symptoms and causes of machinery troubles, specific remedies, etc. This revised library helps you to know the why as well as the how of electrical maintenance and repair work, gives you the ability to handle bigger jobs with surety of results.

10 Days' Free Examination—Easy Monthly Payments

You can secure the use of these five great books on electrical repair work for *ten days' free examination*. When you have seen for yourself what these books are and how much they can help you, send us your first remittance. The balance may be paid in monthly installments of \$2.00 until the price of the library is paid. Send for the books today. Fill in and mail the Free Examination Coupon.

McGRAW-HILL BOOK COMPANY, INC.
330 West 42d Street, New York, N. Y.

Send me the Electrical Maintenance and Repair Library (5 vols.), postpaid, for 10 days' free examination. Within 10 days of receipt I will send \$1.00, and \$2.00 monthly until \$15.00 is paid, or return the books postpaid.

Name
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Position
Company E.C. 8-38

(Books sent on approval in U. S. and Canada only.)

About NECA

[FROM PAGE 54]

Ned P. Hoisington, W. V. Pangborne Co., Inc., Philadelphia, Pa.

The conference accomplished much that will be helpful in smoothing out difficulties encountered in the past in the handling of REA projects, and gave to Mr. Carmody and his staff a better understanding of those problems and the desire of the contractors to assist REA in expediting their program.

The special committee has been asked to serve as a continuing committee until after the Detroit convention in September.

LABOR RELATIONS COMMITTEE PLAN RATIFIED

The Labor Relations Committee Plan, approved by the Executive Committee in June and submitted to NECA membership on June 22nd for mail ballot, was ratified by a large vote in favor, and only seven ballots opposed, upon the completion of the balloting on July 13th. Balloting is now in process for nominations from the twelve Divisions for membership of the Labor Relations Committee. Election of the Committee is expected to be concluded by September 1st.

DUES SIMPLIFIED

A special committee on Dues and Membership Classification submitted recommended simplification of dues classifications and the elimination of all of the higher dues brackets above \$100. The following plan was adopted by the Executive Committee—

Effective January 1, 1939, the annual dues of members shall be \$100, except that a member whose volume of gross sales billed in his electrical contracting and retail merchandising business (exclusive of motor repairs and motor rewinding and/or sales of household appliances) is less than \$200,000 for the twelve months period preceding the month in which his application for membership is submitted, may pay a lesser amount in accordance with the following schedule:

Volume of Business	Annual Dues
\$100,000 to \$200,000	\$75.00
50,000 to 100,000	50.00
25,000 to 50,000	25.00
Under 25,000	15.00

The Executive Committee also recommended that the present practice of accepting notes for dues be discontinued.

*Material for this department
is supplied by the headquarters
staff of the National Electrical
Contractors Association, 420
Lexington Avenue, New York.*

Engineering For Modern Living

[FROM PAGE 10]

compressors, fans, automatic elevators and laundry equipment.

Features of the mechanical design are the controls provided for tenants. The occupant of each apartment has full command of its air conditioning through an individual set of controls consisting of summer thermostat, winter thermostat, summer-winter switch and humidistat. The system is arranged so that any apartments can receive cooling service while others are being heated.

An Exacting Installation

In fitting the dense wiring layout of concealed circuits and outlets to the structural design, the E-J Electrical Installation Company had to install its work in close quarters. Space was utilized for maximum room areas, therefore 2-in. interior partitions generally prevailed. As a result, the distribution scheme for supplying the various floors necessitated risers that would divide the load, to avoid cumbersome cables and conduit sizes. The load centers were likewise planned to meet this condition.

So New York now has a modern apartment structure in which the skill of engineering has provided the magic of year-round weather control. It responds to each tenant's whims of comfortable and quiet living in the midst of the world's largest city. Moreover this structure is an example of adequate wiring for apartment building of the future. Turner Construction Company, general contractors, were responsible for the successful erection of this unusual structure.



Electrical Contracting, August 1938



THE "FLEXIBLE FITTING"

Here's a fitting that opens up a wider field of sales. It is truly the last word in design and workmanship, with features such as larger wiring space, no ear lugs, unbreakable, and, of course, flat-back.

IT'S INTERCHANGEABLE

The OVALET, besides being made of the finest malleable to insure its strength, and its cadmium finish to protect against the elements of rust and corrosion, is designed to meet all requirements. Think of the vast field of sales operation afforded by this all-purpose feature and think of the wholesale satisfaction that this fitting will give to any task to which it is assigned.

Stocked in Thirteen Major Cities

Killark has added this line to its present one of more than 1500 types and styles, to warehouse stocks in thirteen major cities, insuring prompt delivery and in many cases effecting a saving in freight rates.

Write for Bulletin

KILLARK
ELECTRIC MFG. COMPANY
Vandeventer & Easton Aves.
St. Louis, Mo.



FEATURES

1. No ear lugs—larger wiring space.
2. Made of finest malleable, therefore unbreakable.
3. Finished in cadmium to resist rust.
4. "Flat-backed" to make every installation sure and permanent.
5. Flexible and interchangeable.
6. Stocked in thirteen major cities.



EQUIPMENT *News*

Outdoor Phototube Relay

A phototube relay built for outdoor service with complete protection from rain and snow, given by heavy, watertight case and lens visor. Specially designed resistor mounted in top of case, with fins for dissipating heat. Unit designed for 115 volt d.c. operation. G-M Laboratories, Chicago, Ill.



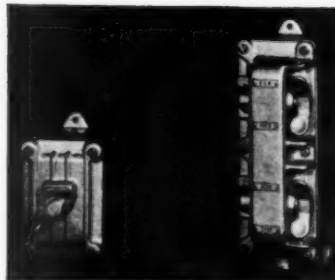
G-M LABORATORIES RELAY

Spot Oiler

This Pres-to oiler looks like a fountain pen and has a spout that noses into out-of-the-way places to apply exact amount of oil needed. By pressing steel point to part to be oiled, approximately $\frac{1}{16}$ of a drop of oil is ejected. Repeat pressing of steel point if more oil is required. Its uses includes precision oiling of office machines, electric appliances, door hinges, clocks, guns, fishing reels, small machines and similar equipment in factory, office and home. The Dill Manufacturing Co., Cleveland, Ohio.



DILL SPOT OILER



WESTINGHOUSE PUSH BUTTON STATION

Push Button Stations

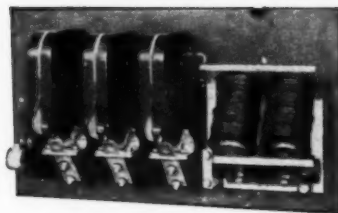
Dust- and water-tight push button stations for heavy duty service provide protection from fumes, dust and moisture. Withstand rough handling, where control currents of magnetic controllers for large motors must be handled for long periods of time. Stations of one to four units are available. Maintained contact units are available by using a standard momentary unit with an interlock unit. Mounting holes on outside of case, cover sealed with cork gasket and oil treated paper and rust-resisting material used throughout. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



KOLTON FUSE REDUCERS

Fuse Reducers

The Kolton line of fuse reducers includes safety feature in knife blade type wherein inserted fuse and reducing clips are inverted to provide a dead front without increasing cabinet depths. In 30- and 60-amp. sizes, the curved construction of contact pieces exerts continuous pressure, thus eliminating contact heating difficulties. Available for reduced fusing: 60/30; 100/30 or 60; 200/30, 60 or 100; 400/30, 60, 100 or 200 and 600/30, 60, 100, 200 or 400. Kolton Electric Manufacturing Co., 123 New Jersey Railroad Ave., Newark, N. J.



G. E. HUMLESS CONTACTOR

Humless Contactor

A new line of d.c. operated a.c. contactors for use where noise reduction is important. Suitable for use in office buildings, theatres, auditoriums, power company substations, stores, ocean liners, show rooms, large private residences and similar places where magnetic hum is objectionable. Some of the features are: small amount of power required to hold circuit closed; unaffected by normal voltage variations; inexpensive and simple in construction; current-carrying parts rated on an eight-hour basis at 600 volts, and can be used either on a.c., through rectifiers, or directly on d.c. General Electric Company, Schenectady, N. Y.



HARTMAN BUSHINGS

Ground Bushings

These ground bushings have a set screw to adjust bushing at any point and a long screw and washer under which ground wire may be folded. Made of cast aluminum alloy or brass with a buff polished finish. Sizes $\frac{1}{4}$ -in. to 4-in. B. Hartman, 708 West Esther St., Box 708 W. State St., Long Beach, Calif.

Test Plier

A pocket plier for testing 110 to 600 volts, with a removable Tungsten lamp. Made of fibre and thoroughly insulated. Only one hand required for testing. Locates dead circuit and safely removes blown fuse. Tool can also be used to pull fuses 30 to 200 amp. size. Test lamp may be replaced by removing cover. Star Fuse Company, Inc., 235 Canal St., New York.



STAR TEST PLIER

Electrical Contracting, August 1938

Highly

INSULATING

You'll find Security Friction Tape in the hands of electricians everywhere...because of its great tensile strength...because it grips like a vise...and because of its high dielectric strength. When it comes to tape, see that there's more Security on the job.



NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION

SECURITY

SECURITY BEYOND PRICE
AND SPECIFICATIONS



United States Rubber Company

ALSO U. S. ELECTRICAL WIRES AND CABLES, LINEMEN'S BLANKETS, SWITCHBOARD MATTING

SAVE Time and Money with Greenlee Tools



Hydraulic Conduit Benders

Greenlee Hydraulic Benders are time and money savers, because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire and cable. They are simple to operate and are readily portable.



Knockout Tools

Greenlee Knockout Punches and Cutters are time savers and profit makers, because they make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without reaming or filing.

Other Greenlee Tools

Hydraulic Pipe Pushers Joist Borers
Bit Extensions Electricians' Bits

Let us send Complete Information

GREENLEE TOOL CO.
ROCKFORD ILLINOIS

Greenlee Tool Co., Rockford, Illinois

Please send complete information on:

☐ Knockout Tools ☐ Conduit Benders

Name.....

Street.....

City.....

State.....

My Jobber is..... EC-8-38



[FROM PAGE 60]

Arc Welder

A new transformer-type arc welder, known as the Trans-Arc, offers low open-circuit voltage for greater safety, and high voltage for maintaining the arc. It uses a new circuit which utilizes condensers in combination with welding transformer. Welding current controlled by continuously variable auto-transformer regulator, which varies voltage across condensers. On heavy materials, uniform welds can be produced more consistently because of freedom from "magnetic blow." Available in three sizes—150 amp., 300 amp. and 500 amp. for operation on either 230- or 460-volt, 60 cycle circuits. American Transformer Company, 178 Emmet, St., Newark, N. J.



AMERICAN TRANSFORMER WELDER

Knockout Punch

Knockout punches for cutting and enlarging holes in electric outlet boxes, switchboxes, auto panels, steel shelving and partitions. Machine ribbed to assure finger grip. All parts made of special alloy, oil-hardened tool steel, precision made. Sold in complete sets in leather cases or individual parts. General Hardware Mfg. Co., 16 Warren Street, New York.



GENERAL KNOCKOUT PUNCH

*Always
on the job...*

**TORK
TIME
SWITCHES**
ALL-ELECTRIC

191 SP
1650 Watts
List \$12.75
962 DP
4000 Watts
List \$15.00



BUY through your JOBBER
Send for your copy
of FREE BULLETIN

The TORK CLOCK CO., Inc.
Mount Vernon, New York



A SCREW DRIVER

and
a



TWIST

... nothing else required
to make a perfect joint with

**The MARR
CONNECTOR**

Just pick up a post card and say
"I'd like to try the MARR." We'll
send a sample, FREE. No obligation.

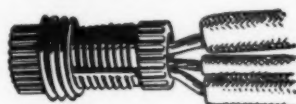
Approved by Underwriters

THE RATTAN MANUFACTURING CO.

322 STATE STREET
NEW HAVEN, CONN., U. S. A.
GENERAL SALES AGENTS HATHEWAY AND CO.
220 CHURCH STREET NEW YORK, N. Y., U. S. A.

Connector

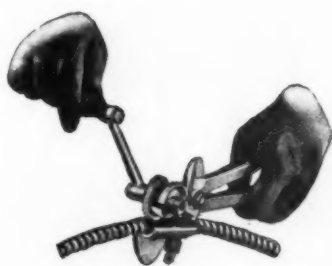
A wire connector, known as "Vise Tite", has a tapered thread making it trouble-free. It will take two or three No. 12 and one No. 18 wires; three No. 12 wires; two No. 14 and either one No. 18 or 16 wires, three No. 14 and either one No. 18 or 16 wires. M & M Company, 21 Muirheid Avenue, Trenton, N. J.



M & M WIRE CONNECTOR

Moisture Proof Wire

A new braid-finish building wire, with an insulation that is highly resistant to moisture. Wire can be obtained in all sizes from No. 14 to 2,000,000-C.M., 600-volt rating. Approved by Underwriters' Laboratories. Can be installed in place of lead-covered cable in moist locations, as described in article 300, Section 3035 of the N.E.C. Comparable with standard building wires in diameter and weight. All standard braid constructions are available—solid single braid, stranded single braid, duplex solid, duplex stranded, solid double braid and stranded double braid. General Electric Co., Bridgeport, Conn.



MECHANICAL PRODUCTS CUTTER

Cable Cutter

The ABX safety cable cutter is a new precision tool that cuts all types and sizes of armored cable. Holds cable in stationary position while rotary saw cuts. Once set, saw does not touch insulation. Eliminates shorts and possibility of fire hazards. Cut armor slips off over conductors without forcing, bending or breaking. Mechanical Products Corp., 2 Broadway, New York.



Transformers for indoor installation



EXPENSIVE fire-proof vaults are no longer necessary for transformers located indoors. New AmerTran Abestol*-Cooled Transformers may be installed wherever they are required with many restrictions applying to oil-immersed equipment removed. Because they are fireproof, they may be placed near the load . . . installation costs are substantially reduced . . . appearance is improved . . . performance, efficiency and safety are unimpaired. May we send you more detailed information on transformers for your needs?

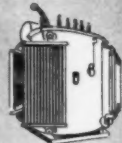
*Abestol is a registered trademark name for a noninflammable, nonexplosive insulating fluid of the askarel family which is used as a coolant in place of transformer oil in especially designed and constructed AmerTran distribution and power transformers. Its use is licensed by General Electric Co. under the Pyranol patents.

AMERICAN TRANSFORMER CO.

178 Emmet St., Newark, N. J.

AMERTRAN

a few AMERTRAN PRODUCTS



POWER TRANSFORMERS



DISTRIBUTION TRANSFORMERS



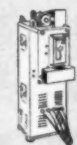
AIR-COOLED TRANSFORMERS



TESTING TRANSFORMERS



INSTRUMENT TRANSFORMERS



VOLTAGE REGULATORS



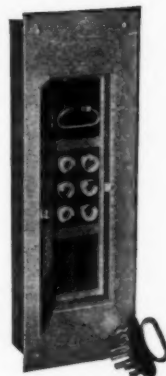
ELECTRONIC RECTIFIERS

Make *Your* Problems *Our* Responsibility



Small dimension panel finished in baked-on black enamel. Furnished also with switches in trim. Convenient knockouts and plenty of wiring space.

Walker engineers are equipped to handle any problem of electrical installation regardless of size. Special cabinets and boxes built to your specifications or designed by our own engineers. Write today telling us your problems.



Steel or aluminum panel with pullout switches for service entrance and range or water heater connections. Plenty of knockouts and wiring space. Horizontal combination furnished.



WALKER ELECTRICAL CO.

Atlanta — — Georgia



FOR A
**PERMANENT
TROUBLE-PROOF
JOB**
ALWAYS SPECIFY

CENTRAL

RIGID STEEL CONDUIT

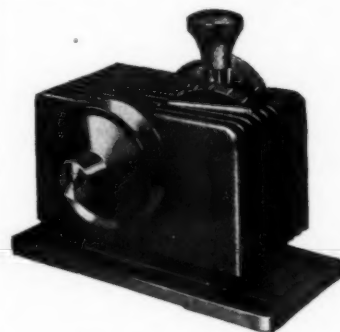
Make a memorandum to use "CENTRAL" on your next job—the 12 point Rigid Steel Conduit that combines ALL the advantages of the perfect conduit including unusual wall thickness, greater tensile strength, balanced weight, standard threading, all of which give "CENTRAL" the maximum resistance to arcing, vibration or mechanical injury.

CENTRAL TUBE COMPANY
PITTSBURGH, PA.

"There's
**TESTED
STRENGTH**
in
**EVERY
LENGTH"**

Speed Transmission

The "Select-O-Speed" transmission is applicable to all machinery that is now operating at a fixed speed when variable speed is necessary or desirable. Uses standard "V" belts. Gives infinite selection of speeds over a 5 to 1 or greater ratio by movement of a control lever. May be mounted on floor, wall, ceiling, upside down or right-side up and works without noise or vibration in any position. Several sizes available up to 7½ hp. Ideal Commutator Dresser Co., 1041 Park Ave., Sycamore, Ill.



IDEAL "SELECT-O-SPEED"



OSTER POWER VISE STAND

Power Vise Stand

A new pipe vise stand equipped with a power unit and chuck for all sizes of pipe up to 2 inches, concealed in upper part of stand. Powered by a 110-volt universal motor giving chuck variable speeds from 14 to 32 R.P.M. Without legs, net weight is 110 lbs. The Oster Manufacturing Co., 2057 East 61st Place, Cleveland, Ohio.

Safety

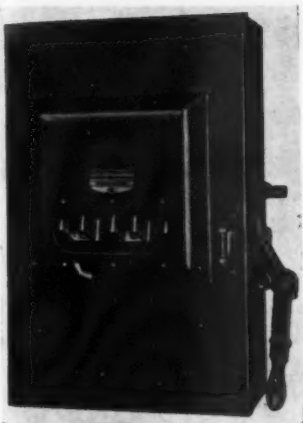
But safety in cover-ter-pr used cover make fuse posts silver const releas 30- to and N. 1.

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CUTLER-HAMMER SAFETY SWITCH

Safety Switch

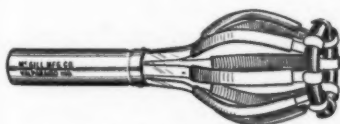
Bulletin 4101 current breaker mill duty safety switch is now available with window in cover to make inspection of blades possible from outside. Window is $\frac{1}{8}$ -in. shatter-proof glass. Sponge rubber gasket is used to cushion glass and seal opening in cover. Some of the features are quick make and break mechanism; pressure type fuse clamps; non-current carrying hinge posts; double-break air-blanketed contacts; silver plated blades and jaws; unit pole construction and interlocked cover with key release. Available in standard sizes from 30- to 1200-amperes up to 600-volts, fusible and non-fusible. Cutler-Hammer, Inc., 228 N. 12th St., Milwaukee, Wis.

Solder

A new line of solders known as Rich-loy "Hi-Tensile". Some of the improvements are—increased tensile strength, lower melting point, cleaner, greater ability to bond for electrical work of all kinds, increased conductivity. Available in bar, pig or plain wire form. National Cable and Metal Company, 1727 Standard Ave., Glendale, Calif.

Lamp Changer

A new lamp changer with powerful coil-spring gripper that removes tight fitting lamps from positions out of reach by hand. Can also be used to remove street series lamps, which have catches to hold them in sockets. Made in four head sizes, for handling of lamp sizes ranging from 15 to 1,000 watts. Furnished in either straight or angle adjustment style. McGill Manufacturing Co., Valparaiso, Ind.



McGILL LAMP CHANGER

Proof of Merit! LOEFFLER

INTERIOR TELEPHONES

used in

New York's first
air conditioned
apartment



Engineered for Comfort — this smart Madison Avenue structure combines dignity with the quiet of a country home for 55 families.

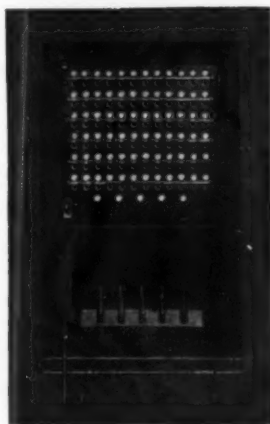
Service Plus — Each apartment has one or more private selective ringing and talking phones for reaching service employees quickly.



Modern Service — Lobby attendant announcing guests from a Loeffler Switchboard.



A custom built quality apparatus.



25 East 83rd Street, now stands as New York's most up-to-date apartment building. Air Conditioning throughout — sound proof walls — and Loeffler telephone equipment.

Loeffler congratulates architect, engineer and owners of this fine, modern building, and is proud of the part that its equipment will play in adding to the comfort and convenience of the residents.

Wherever quality telephone equipment is needed, specify Loeffler. Our complete catalog will be sent on request.

WRITE TODAY FOR BULLETIN 16

L. J. LOEFFLER, Inc.

351 WEST 41st STREET, NEW YORK, N. Y.

WHEN YOU SPECIFY

KNOX
YOU SPECIFY QUALITY



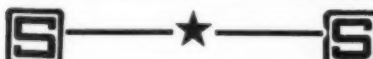
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Whether for Electrical, Radio or Neon we have the answer and can supply your insulator requirements.

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SHERMAN WEDGE-GRIP CONNECTORS

for service entrance and all small wire connections



Assembly

- A labor saver—a twist of the screw and the job is done
- Smooth and "streamlined" joint—no awkward projections
- Economical — can be disconnected and used again

Contractors will find that Sherman Wedge-Grip Connectors make quick, strong, safe Solderless connections at low cost and are far superior to soldered joints. A size for every need. Send for Bulletin No. 22



SC-6



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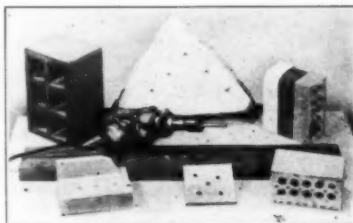
H. B. SHERMAN MFG. CO.
Battle Creek, Mich.



[FROM PAGE 65]

Flat Drill

It is claimed that the drilling time in brick, tile, marble, concrete, slate, asphalt, wallboard and other non-metallic materials is reduced by use of Tungsten Carbide tipped flat drills. For use by electrical and other contractors, as well as maintenance and service men, wherever drilling of such holes is necessary. Super Tool Company, 356 E. Congress Street, Detroit, Mich.



SUPER TOOL FLAT DRILL

Indirect Lighting Unit

Ancoda indirect unit for high intensity requirements, sizes from 200 to 1500 watt lamps, reflector diameter from 15-in. to 26-in. Made of aluminum with Alzak finish, louvers on reflectors golden bronze. Two toned exterior light spills can be furnished. Edwin F. Guth Co., St. Louis, Mo.

30TH ANCODA UNIT



MERCROID CONTROL

Temperature Control

A new compact unit, known as Ducta-therm, designed for the control of temperature in air conditioning ducts. Also used as a limit or fan control for warm air furnaces. Has magnetic sealed mercury contact switch. Switch cannot be affected

VICTOR "FORCE AIR" EXHAUST FANS

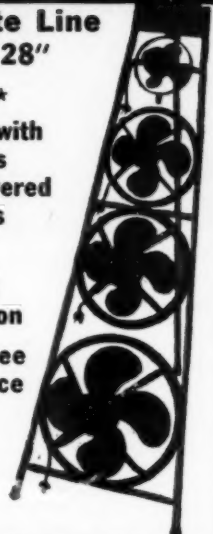
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6" to 28"

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Equipped with
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Motors

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Construction
Trouble-free
performance

★ ★
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Prices!

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Catalog to
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by dust, dirt or corrosive gases. Adjustment is located outside of instrument. Two ranges are available—50 to 300-deg. F. and 250 to 500-deg. F. Ductatherm is furnished standard with flat mounting flange. Also available with adjustable flange for slope mounting. Available for low voltage 9/10 amp. 24 volts. The Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.

Luminaire

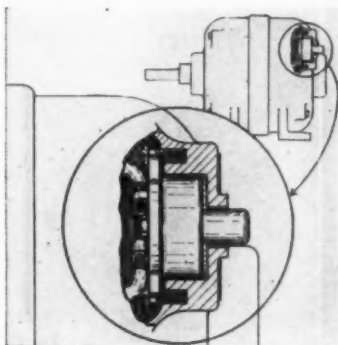
"Mark" indirect luminaire for use with 1000 watt medium bipost (T-24) lamp for small or low ceilinged interiors demanding high lighting levels with a minimum number of pendants of the smallest possible proportions. Made of aluminum. Curtis Lighting, Inc., 1123 W. Jackson Blvd., Chicago, Ill.



CURTIS MARK LUMINAIRE

Motor Thermostat

Disc-operated overheat protection thermostat is now available for all fractional horsepower motors. Consists of small thermostatic bimetal disc placed next to heater wire. Contacts are welded to disc, and placed in series with line circuit. Thermostat is applicable to single phase 110 and 220-volt motors up to and including 1 h.p. Available with either manual or automatic reset. Spencer Thermostat Company, Attleboro, Mass.



SPENCER THERMOSTAT

ROME-CABLE BUILDING WIRE 3 POINT LANDING

The skilled plane-pilot knows that a 3-point landing is the safest that can be made. Rome Cable Building Wire helps you to make a perfect "3-point" profit landing. Its superior quality and greater durability will: 1, build and maintain your reputation for quality work—2, bring you repeat business—3, keep your customers satisfied, because of the better service it gives them.

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Cable, Intermediate 30% and Superaging
Approved by the Underwriters Laboratories, Inc.
N.E.C.S.
Flame & Moisture Resistant

Black finish for Quick and Easy Pulling
Long Aging Rubber Uniformly Small Diameters
Clean—Easy Stripping
Eight Clear Distinct Colors



PRODUCTS

Hot rolled rods, bare and tinned copper wire, bare and tinned strand, U.R.C. weatherproof wire, cotton, paper and asbestos magnet wire, rubber insulated wires and cords, lead covered cables.

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New York, Chicago, Philadelphia, Pittsburgh, Richmond, Cincinnati, Cleveland, Boston, Dallas, Los Angeles.

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No. 252-R
TWO GANG BOX

Two gang Adjustable Floor Box with No. 208 Receptacle in one section. One cover plate with 1/4" Flush Brass Plug and the other cover plate with 2" Flush Brass Plug.

WIRING SPECIALTIES

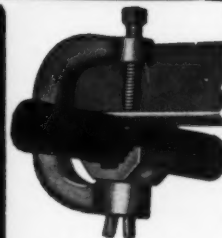


No. 284 DUPLEX
RECEPTACLE NOZZLE

With 1/2" brass pipe extension. Neatest and most compact fitting obtainable. Also available with 3/4" pipe extension. Fullman also offers Duplex Telephone Nozzles.

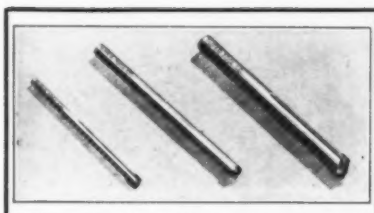
Sell and install
LATROBE—the complete line for residential, commercial and industrial work.
Catalog on request

FULLMAN MFG. CO.
LATROBE, PENN.



No. 470 PIPE OR
CONDUIT HANGER

Pipe support can be turned freely, permitting pipe to run parallel, or at right angles to beam. Eliminates drilling or use of straps. Will accommodate sizes of 1/2", 3/4" and 1" pipe to steel beams 3/4" thick.



**SAVE 50 TO 70%
OF YOUR TIME**

Drilling

**CONCRETE BRICK
TILE GLASS
MARBLE WALLBOARD,
Etc., With**

**SUPER
CARBIDE TIPPED
FLAT DRILLS**

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**Open the door to
NEW BUSINESS**
with the

*Continental
Numbrlite
Push*

REPLACES
PRESENT
BELL BUTTON

NO CHANGE IN
PRESENT WIRING

**ILLUMINATED
NUMBER and
BELL BUTTON**

...for the home

CONTINENTAL MFG. CO. INC. N.Y.C.

Every home owner is a prospect for Numbrlite Push—because it gives added convenience and distinction at a nominal cost. Deluxe Model #3829—Available in Solid Hammered Brass, Swedish or Bronze, to match house hardware, at \$2.85 retail. Standard Model #3829—Available in Bronze Plated \$1.25 retail.

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FOR
DETAILS**

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64 W. 23rd St., New York, N. Y.

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* See 1937-1938 Buyers' Reference number of Electrical Contracting for additional information on these companies and their products.

GEDNEY

FINE FITTINGS



A new line of electrical fittings, designed by old-timers in the electrical business. Tested and proved in every detail. If your wholesaler cannot supply the GEDNEY LINE, write direct for details and prices.



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It PAYS TO BUY from CO-OP

Co-op Monthly

CONTRACTOR'S WHOLESALE BUYING GUIDE

PRICE QUALITY SERVICE

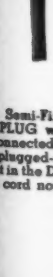
Send For Co-op Monthly CATALOG

CO-OP ELECTRIC SUPPLY CO.

812 W. Jackson Blvd., Chicago, Ill.

You'll find the answer to thousands of questions about electrical products in





Semi-Fit
PLUG w
connected
plugged-
in the D
cord no



ECONOMICAL • CONVENIENT • FLEXIBLE

BULL DOG

Trol-E-Duct
UNIVERSAL TYPE

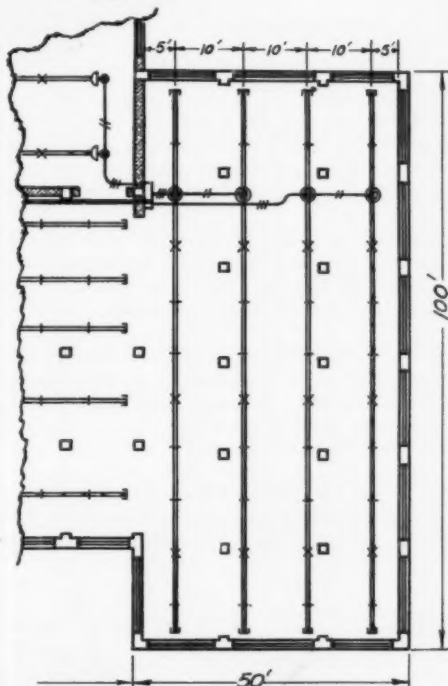
THE Modern WIRING SYSTEM

WITH MOVABLE or SEMI-FIXED Outlets

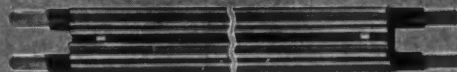
Trol-E-Duct is a continuous Busway System of Electrical Distribution . . . *Movable* current collecting Trolleys which may be moved along the Duct run or *Semi-Fixed* Twistout Plugs which can be inserted at any point in the Duct, serve as current sources for Lights, Portable Tools and other devices . . . The flexibility of *Movable* Outlets or the creation of *Fixed* Outlets at any desired point, is equally available.

A complete line of Duct Sections, Couplings, Elbows, End Caps and other fittings provides a prefabricated Wiring System to fit the layout of any building. Ease of installation or removal is also a feature of the system.

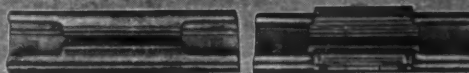
These views show part of a Wiring Layout and Installation of Universal Trol-E-Duct in a Modern Industrial Plant.



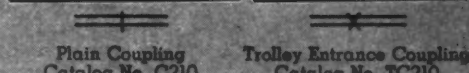
The symbols shown on the Wiring Layout represent various sections or parts of the Trol-E-Duct System as indicated



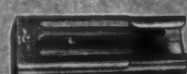
10 Ft. Duct Sections. Catalog No. D210



Plain Coupling
Catalog No. C210



Trolley Entrance Coupling
Catalog No. TC210



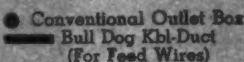
Trolley Entrance End Cap
Catalog No. TEC210



Feed-in End Cap (cover removed)
Catalog No. NEF2503

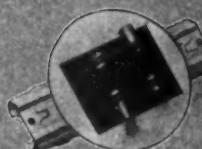


Hangers
Catalog No. H210-0



Conventional Outlet Box
Bull Dog Kbl-Duct
(For Feed Wires)

Bull Dog Distribution Center



Feed-in Coupling
Catalog No. FC210

WRITE FOR POCKET SIZE BOOKLET:

"How to Mobilize Lighting and Power Outlets with TROL-E-DUCT"

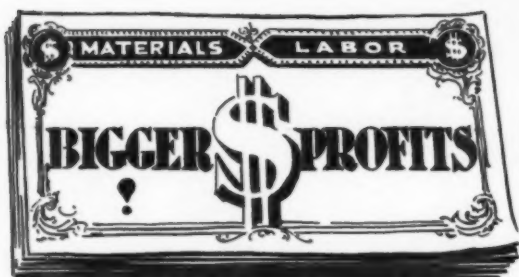
BULL DOG ELECTRIC PRODUCTS COMPANY

Pioneers In Flexible Electrical Distribution Systems

DETROIT, MICHIGAN

BULL DOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO, ONT.





... on "underground"
using

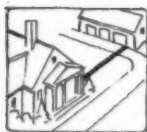
ORANGEBURG

the new Dual Economy NOCRETE CONDUIT



For use underground

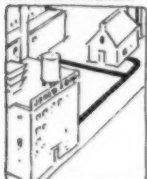
without concrete encasement



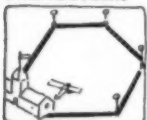
FROM RESIDENCE TO GARAGE
AND OTHER OUTBUILDINGS



BETWEEN BUILDINGS IN CITIES
AND OTHER INSTITUTIONS



BETWEEN BUILDINGS IN
INDUSTRIAL PLANTS



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SIGNAL SYSTEM
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